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HARVARD SCHOOL
OF
PUBLIC HEALTH

*Announcement of Courses
and General Information*



1967-68

55 Shattuck Street, Boston, Massachusetts 02115

PUBLISHED BY THE UNIVERSITY



Graduate students from many parts of the world come to study in Harvard's School of Public Health. Physicians, engineers, physical scientists, social scientists, and other health specialists prepare here for careers of leadership in teaching, research and the administration of health services, both nationally and internationally.

The Harvard School of Public Health operates as an autonomous unit of Harvard University in close association with the Faculties of Arts and Sciences, Government, Business Administration, Education, Law, Medicine and Dental Medicine.



ONE

CONTENTS

INTRODUCTORY INFORMATION

THE ACADEMIC CALENDAR	9
PRESIDENT AND FELLOWS OF HARVARD COLLEGE	11
ADMINISTRATION OF THE HARVARD SCHOOL OF PUBLIC HEALTH	12
The Administrative Officers	12
The Administrative Board	14
OFFICERS OF INSTRUCTION AND RESEARCH	15
The Faculty of Public Health	15
The Teaching Staff	22
The Research Staff	27
Professors Emeriti	33
THE SCHOOL AND ITS FACILITIES	35
History of the School	35
Objectives of the School	36
Dual Role of the School	37
The Location and Buildings	38
Other Facilities	38
Libraries	40
Shattuck International House	42

TWO

ADMISSION AND DEGREES

APPLICATION FOR ADMISSION	47
LIVING EXPENSES	48
COURSES OF STUDY AND DEGREES	49
Master of Public Health	49
Master of Science in Hygiene	51
Master of Industrial Health	53
Doctor of Public Health	54
Doctor of Science in Hygiene	55
REQUIREMENTS FOR DOCTORAL DEGREES	55
Grading System	58

Residency Programs	59
Special Students	60
Degrees in Engineering	60

THREE

CONTENT OF COURSES

BIOSTATISTICS	65
EPIDEMIOLOGY	71
KRESGE CENTER FOR ENVIRONMENTAL HEALTH	76
Environmental Health Courses	77
Industrial Hygiene	83
Physiology	87
Sanitary Engineering	91
CENTER FOR THE PREVENTION OF INFECTIOUS DISEASES	93
Microbiology	94
Tropical Public Health	104
HEALTH SERVICES ADMINISTRATION	113
MATERNAL AND CHILD HEALTH	121
NUTRITION	126
BEHAVIORAL SCIENCES	132
CENTER FOR POPULATION STUDIES	138
DEMOGRAPHY AND HUMAN ECOLOGY	141
INTERDEPARTMENTAL COURSES	145

FOUR

SPECIAL PROGRAMS

PROGRAMS IN INTERNATIONAL HEALTH	149
HARVARD UNIVERSITY INTERFACULTY PROGRAM ON HEALTH AND MEDICAL CARE	155
POSTDOCTORAL FELLOWSHIP PROGRAM IN DENTAL PUBLIC HEALTH	157
SPECIAL COURSES IN PREPARATION FOR CAREERS IN TEACHING	158

FIVE

GENERAL INFORMATION

REGISTRATION	163
INTERNATIONAL STUDENTS	163
FEES AND EXPENSES	164
STUDENT HEALTH SERVICE	167
HOUSING	169
EMPLOYMENT	170
FELLOWSHIPS AND TRAINEESHIPS	170
STUDENTS 1966-67	173
GEOGRAPHICAL ORIGINS OF STUDENTS	177
DEGREES CONFERRED IN JUNE, 1966 AND MARCH, 1967	178
INDEX TO OFFICERS OF ADMINISTRATION, INSTRUCTION AND RESEARCH	183
SCHEDULE OF COURSES, FALL TERM, 1967-68	187



This modern building of the Harvard School of Public Health houses the Kresge Center for Environmental Health, the Guggenheim Center for Aerospace Health and Safety, the Nutrition Research Laboratories, and the Department of Demography and Human Ecology, a part of the Center for Population Studies.

ONE

INTRODUCTORY INFORMATION

ACADEMIC CALENDAR-1967-1968

***SEPTEMBER 11, MONDAY,
10 A.M.** Opening session and registration for new International Students

***SEPTEMBER 13, WEDNESDAY,
2 P.M.** Opening session and registration for new U.S. Students

The period between the opening sessions and September 22 will be devoted to individual conferences with faculty members, selection of courses of study and orientation lectures.

***SEPTEMBER 18, MONDAY, 10 A.M.** Opening session and registration for students enrolled in 1966-67

FALL TERM, SEPTEMBER 25, 1967 TO FEBRUARY 3, 1968

SEPTEMBER 25, MONDAY	First Period Courses begin
OCTOBER 12, THURSDAY	Columbus Day: a holiday
OCTOBER 13, FRIDAY	Last day for changes in "a" and "a,b" courses of study
NOVEMBER 11, SATURDAY	Veterans' Day: a holiday
NOVEMBER 18, SATURDAY	First Period ends
NOVEMBER 20, MONDAY	Second Period Courses begin
NOVEMBER 23, THURSDAY	Thanksgiving Day: a holiday
DECEMBER 8, FRIDAY	Last day for changes in "b" courses of study

Recess from Thursday, December 21, 1967 to January 3, 1968

JANUARY 27, SATURDAY Second Period Courses end
JANUARY 29, MONDAY Directed reading period, supervised special stud-
TO FEBRUARY 3, SATURDAY ies or field observations

* All students are required to attend the opening session and to be present for the registration period.

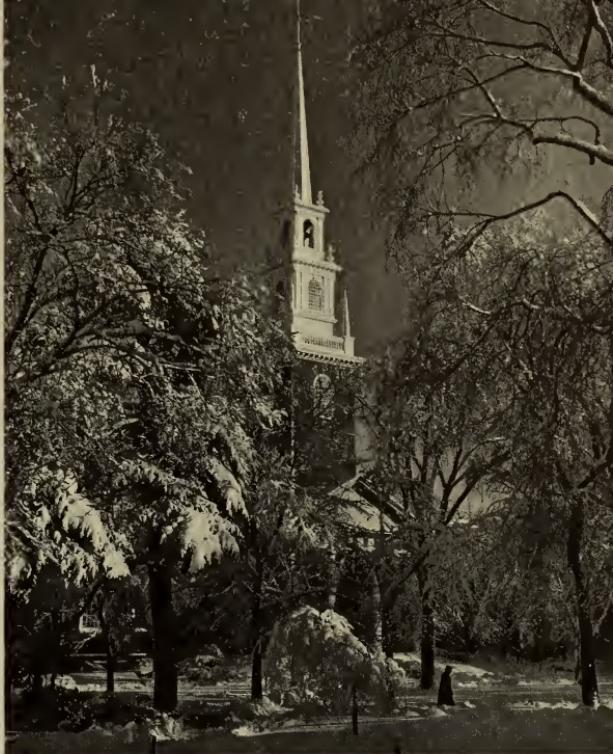
SPRING TERM, FEBRUARY 5, 1968 TO JUNE 13, 1968

FEBRUARY 5, MONDAY	Third Period Courses begin
FEBRUARY 22, THURSDAY	Washington's Birthday: a holiday
FEBRUARY 23, FRIDAY	Last day for changes in "c" and "c,d" courses of study
MARCH 30, SATURDAY	Third Period ends

Recess from Sunday, March 31, 1968 to Sunday, April 7, 1968

APRIL 8, MONDAY	Fourth Period Courses begin
APRIL 26, FRIDAY	Last day for changes in "d" courses of study
MAY 30, THURSDAY	Memorial Day: a holiday
JUNE 1, SATURDAY	Fourth Period ends
JUNE 3, MONDAY TO JUNE 12, WEDNESDAY	Post-class Period — Forums
JUNE 13, THURSDAY	Commencement

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A.B., B.M., M.D., Dr.P.H., Lecturer on Epidemiology; *Chief, Field Epidemiological Research Section, National Heart Institute, Framingham.*

*ROBERT BROWN PENNELL

S.B., S.M., Ph.D., Lecturer on Immunology; *Director of Laboratories, The Protein Foundation, Inc.*

*HARRY TARLEY PHILLIPS

M.B., Ch.B., D.P.H., M.D., Lecturer on Health Services Administration; *Chief of Bureau of Chronic Disease Control, Massachusetts Department of Public Health and Superintendent, Lemuel Shattuck Hospital.*

*CHARLES HENRY RAMMELKAMP

A.B., M.D., S.D. (hon.), Visiting Lecturer on Microbiology; *Professor of Medicine, Western Reserve University School of Medicine.*

MURRAY SAFFRAN

B.Sc., M.Sc., Ph.D., Visiting Lecturer on Population Studies.

*DAVID JUDSON SENCER

M.D., M.P.H., Visiting Lecturer on Tropical Public Health; *Chief, National Communicable Disease Control Center.*

DAVID SIDNEY SHAPIRO

A.B., Ph.D., Lecturer on Social Psychiatry.

*SAMUEL WILLIAM SIMMONS

S.B., A.M., Ph.D., Visiting Lecturer on Tropical Public Health; *Scientist Director and Chief, Technology Branch, National Communicable Disease Control Center.*

HARVARD UNIVERSITY

*HOPE HENNEKE SNIDER

A.B., M.D., M.P.H., Lecturer on Medical Care; *Director, Pearl Aging Center, Peter Bent Brigham Hospital.*

*ROBERT BRIGGS WATSON

S.B., M.D., M.P.H., Visiting Lecturer on Tropical Health; *Lecturer on International Health, School of Public Health, University of North Carolina.*

*JOHN MARSHALL WEIR

S.B., M.D., Ph.D., M.P.H., Visiting Lecturer on Tropical Public Health; *Director, Medical and Natural Sciences, The Rockefeller Foundation.*

INSTRUCTORS

CLIFTON AUGUSTUS BAILE

S.B., Ph.D., Instructor in Nutrition.

*HELEN DOROTHY COHN

M.P.H., Instructor in Applied Public Health Nursing; *Assistant Professor of Public Health Nursing, Boston University School of Nursing.*

*RUTH ADA COWIN

S.B., S.M., Instructor in Applied Public Health Social Work.

*ILSE ELISE GORBACH

A.B., M.D., M.P.H., Instructor in Applied Maternal and Child Health.

MADGE LOUISE MYERS

A.B., S.M., Instructor in Nutrition.

PATRICIA STEFANIK REMMELL

S.B., S.M., Instructor in Nutrition.

ALVAN GERALD RENTHAL

A.B., M.D., M.P.H., Instructor in Health Services Administration.

*BENJAMIN SACHS

A.B., M.D., M.P.H., Instructor in Applied Maternal and Child Health; *Southeastern Regional Director, Massachusetts Department of Public Health.*

*CATHERINE COOLIDGE SEARS

A.B., M.D., M.P.H., Instructor in Tropical Health.

*HENRY WECHSLER

A.B., A.M., Ph.D., Instructor in Social Psychology; *Research Director, The Medical Foundation, Inc.*

SCHOOL OF PUBLIC HEALTH

*JOSEPH ANTHONY YACOVONE

A.B., D.M.D., M.P.H., Instructor in Dental Public Health; *Chief, Division of Dental Public Health, Rhode Island Department of Health.*

TEACHING FELLOW

*RODRIGO GUERRERO

M.D., S.M. in Hyg., Teaching Fellow in Demography and Human Ecology.

THE RESEARCH STAFF

SENIOR RESEARCH ASSOCIATES ‡

HARRY HEIMANN

S.B., M.D., Senior Research Associate in Environmental Health and Lecturer on Occupational Medicine.

JOHN WILLIAM VINSON

S.B., S.D. in Hyg., Senior Research Associate and Lecturer on Microbiology.

JOHN BENJAMIN WYON

B.A., M.B.,B.Ch., M.P.H., Senior Research Associate and Lecturer on Population Studies.

ALFRED YANKAUER

A.B., M.D., M.P.H., Senior Research Associate in Maternal and Child Health.

RESEARCH ASSOCIATES §

HARBEN JAY BOUTOURLINE-YOUNG

M.B.,B.S., D.C.H., M.D., Research Associate in Human Growth and Development (Absent 1967-68).

ROBERT ALLEN DANLEY

A.B., S.M., Ph.D., Research Associate in Sociology.

HELEN GIDEON

M.B.,B.S., M.P.H., Research Associate in Population Studies (Absent 1967-68).

ROLAND CHESLEY MOORE

A.B., A.M., Ph.D., Research Associate in Occupational Safety.

‡ Appointments with administrative tenure.

§ Term appointments.

HARVARD UNIVERSITY

ROBERT RIX PENSINGER	A.B., S.M., B.V.S., D.V.M., Research Associate in Veterinary Physiology.
MANUEL ROCA-GARCIA	M.D., M.P.H., Research Associate in Microbiology.
CARL COLEMAN SELTZER	A.B., Ph.D., Research Associate in Physical Anthropology.
FREDERICK JAMES VILES, JR.	S.B., S.M., Research Associate and Lecturer on Industrial Hygiene.

RESEARCH ASSOCIATES

CARL JAY BAJEMA	S.B., A.M., Ph.D., Research Associate in Population Studies.
ROBERT CHARLES BENFARI	A.B., Ph.D., S.M. in Hyg., Research Associate in Psychology.
*GRETCHEN MARY BERGGREN	A.B., M.D., S.M. in Hyg., Research Associate in Demography and Human Ecology; <i>Physician, Hôpital Albert Schweitzer, Haiti.</i>
*MARTHA DRESNER BERLINER	A.B., S.M., Ph.D., Research Associate in Microbiology; <i>Instructor in Biology, Simmons College.</i>
JOSEPH DAVID BRAIN	A.B., S.M., S.M. in Hyg., S.D. in Hyg., Research Associate in Physiology.
CARLO BRUNI	M.D., Research Associate in Pathology.
EDWARD JAMES BURGER	B.Sc., M.D.C.M., M.I.H., S.D. in Hyg., Research Associate in Physiology.
RUTH MARGARET BUTLER	A.B., S.M., Research Associate in Social Work.
*ARTHUR PHILIP CONNELLY, JR.	A.B., M.D., Research Associate in Medicine; <i>Assistant Physician, University Health Services.</i>
THOMAS JOSEPH CROWLEY	S.B., S.M., Research Associate in Environmental Health and Safety.
JEANNETTE HOLZAPFEL FORSYTH	A.B., Ph.D., Research Associate in Nutrition.

SCHOOL OF PUBLIC HEALTH

*CHARLES EDWARD OVID FRASER	B.V.Sc., M.R.C.V.C., D.T.V.M., S.M., Research Associate in Microbiology; <i>Microbiologist, New England Regional Primate Research Center.</i>
*ROSE EPSTEIN FRISCH	A.B., A.M., Ph.D., Research Associate in Population Studies.
*KENNETH FRANCIS GIRARD	S.B., M.Sc., Ph.D., Research Associate in Microbiology; <i>Assistant Director, Division of Diagnostic Laboratories, Massachusetts Department of Public Health.</i>
WILLIAM BOYD HOOD	S.B., M.D., Research Associate in Medicine (through October 31, 1967).
*VICTOR LORIAN	M.D., Research Associate in Microbiology; <i>Director, Clinical and Research Laboratories, Sanatorium Division, Boston City Hospital, and Assistant Clinical Professor, Boston University School of Medicine.</i>
MARY BEATRICE MC CANN	S.B., M.P.H., M.D., Research Associate in Nutrition.
HARRY LOUIS MC COMBS	S.B., M.D., Research Associate in Pathology.
*JOSEPH MORTON MILLER	A.B., M.D., M.P.H., Research Associate in Medicine; <i>Associate in Medicine, Peter Bent Brigham Hospital and Medical Director, Massachusetts Bay Transportation Authority.</i>
LEO MILLER	A.B., S.M. in S.S., M.P.H., Ph.D., Research Associate in Social Work (through December 31, 1967).
*ALICE LONGAKER NANGERONI	A.B., Research Associate in Behavioral Sciences.
CHARLES NEAVE	A.B., M.D., M.P.H., Research Associate in Population Studies (from September 1, 1967).
MARY LOUIE NEW	S.B., M.P.H., Research Associate and Lecturer in Biostatistics.

HARVARD UNIVERSITY

CANDACE ANN OVIATT	S.B., Ph.D., Research Associate in Marine Biology.
MARIE EBE RECA	Dr.Chem., Research Associate in Medicinal Mycology.
PETER PHILIP ROGERS	B.Eng., S.M., Ph.D., Research Associate in Population Studies; <i>Lecturer on Computer Graphics, Harvard School of Design.</i>
CONSTANTINA SAFILIOS-ROTHSCHILD	S.M., Ph.D., Research Associate in Population Studies.
*JOHN MASON TYLER	A.B., M.D., Research Associate in Physiology; <i>Senior Physician and Director of the Pulmonary Laboratory, Lemuel Shattuck Hospital.</i>
DWIGHT WINGATE UNDERHILL	B.E., S.M. in Hyg., S.D. in Hyg., Research Associate in Physiology.
VYTAUTAS IGNAS UZGIRIS	A.B., S.B., M.D., Ph.D., Research Associate in Population Studies.
*HERNAN VELEZ	M.D., Clinical Research Associate in Nutrition; <i>Associate Professor of Internal Medicine, School of Medicine, University of Medellin, Colombia.</i>
LUISA CORA WEISSENBORN	M.D., Research Associate in Physiology.
NORBERT LEONARD WIECH	S.B., S.M., Ph.D., Research Associate in Nutrition.
*GRACE CHEN YUAN	B.Sc., M.D., Research Associate in Microbiology.

RESEARCH AND FIELD STAFF

*RODERICK ANTONY ARMSTRONG	B.A., L.M., S.S.A., Research Consultant in Social Psychiatry; <i>Executive Director, Digby-Annapolis Mental Health Service Board, Inc.</i>
*A. MICHAEL DAVIES	M.B., Ch.B., M.D., Consultant on Epidemiology; <i>Head, Department of Medical Ecology, Hebrew University Medical School.</i>

SCHOOL OF PUBLIC HEALTH

*JEAN-NOEL FORTIN	B.A., M.A., M.D., Consultant in Psychiatry; <i>Associate Professor of Psychiatry, Department of Psychiatry, University of Montreal.</i>
*JOHN SNODGRASS HARDING	A.B., A.M., Ph.D., Research Consultant in Psychology; <i>Professor, Department of Child Development and Family Relationships, Cornell University.</i>
*EDGAR BURNHAM MCKAY	S.B., Ed.M., Consultant in Sociology; <i>Associate Professor of Modern Society, University of Maine.</i>
*DANIEL JOHN O'CONNELL	M.D., Consultant in Psychiatry; <i>Executive Secretary, Association of American Indian Affairs.</i>
VICTOR GEORGE CARDOZA	Field Project Administrator.

SENIOR RESEARCH FELLOW

IAN DOUGLAS GREEN	M.B., B.S., M.R.C.P., Senior Research Fellow in Physiology.
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RESEARCH FELLOWS

JESUS ALBERTO BIANCO	M.D., Research Fellow in Nutrition.
EMILE SHENUDA DEMIAN	B.Sc., M.Sc., Ph.D., Research Fellow in Tropical Public Health.
ROBERT ALBERT ENGLAND	A.B., M.D., Research Fellow in Nutrition.
KEVIN EUGENE FINUCANE	M.B., B.S., M.R.A.C.P., Research Fellow in Physiology.
DONALD EDWARD GILBERTSON	S.B., S.M., Ph.D., Research Fellow in Tropical Public Health.
ZVI GLICK	B.Sc., S.M., Ph.D., Research Fellow in Nutrition.
RONALD GOLD	A.B., M.D., M.P.H., Research Fellow in Tropical Public Health.
FREDERIC GALLATIN HOPPIN, JR.	A.B., M.D., Research Fellow in Physiology.

HARVARD UNIVERSITY

WILFRED GREGOR ILTIS	A.B., Ph.D., Research Fellow in Tropical Public Health.
KENJIRO KAWASHIMA	B.Sc., M.Sc., M.D., Research Fellow in Tropical Public Health.
MIRIAM FRIEDMAN KELTY	B.A., M.A., Ph.D., Research Fellow in Nutrition.
RONALD JOEL KNUDSON	S.B., M.D., Research Fellow in Physiology.
GAVRIEL LEWISHON	M.D., Research Fellow in Physiology.
KAARE JULIAN LINDQVIST	V.M.D., M.Sc., Ph.D., Research Fellow in Applied Immunology.
ARTHUR WILLIAM MAHONEY	S.B., Ph.D., Research Fellow in Nutrition.
AVRAHAM RESHEF	M.D., M.P.H., Research Fellow in Nutrition (through December 31, 1967).
DENNIS JOHN SABO	S.B., S.M., Ph.D., Research Fellow in Nutrition.
ERWIN SCHARRER	Dr.Met.Vet., Research Fellow in Nutrition (through December 31, 1967).
DONALD WILLIAM THOMAS	A.B., A.M., Ph.D., Research Fellow in Nutrition.
CARLOS ERNESTO VASSAUX	B.S., M.D., Research Fellow in Nutrition.
BRUCE IRVING VELTMAN	S.B., S.M., Ph.D., Research Fellow in Nutrition.
AMNON WACHMAN	S.B., M.D., Research Fellow in Nutrition.
RICHARD BRUCE WHITING	M.D., Research Fellow in Nutrition.
KAROL STANLEY WISNIESKI	S.B., M.P.H., Research Fellow in Epidemiology and Environmental Health.
MANUEL WORCEL	M.D., Research Fellow in Physiology.
STELLA BERNADETTE YEN	M.D., M.P.H., Research Fellow in Epidemiology.
STEPHAN AGHEK YENIKOMSHIAN	B.Sc., M.D., Research Fellow in Nutrition.

ASSISTANTS

ETHEL JAFARIAN BOWIE	S.B., Assistant in Nutrition.
DOROTHY BRUNO	S.B., Assistant in Nutrition.
*JANET WALKLEY CARES	S.B., S.M. in Hyg., Assistant in Industrial Hygiene
CHARLYNE DEAN COSTIN	A.B., M.S.S.W., Assistant in Social Work.
MIRIAM CATHERINE EKDAHL	S.B., S.M. in S.S., Assistant in Social Work.
* LEO LEVINE	S.B., Assistant in Microbiology; <i>Chief of Laboratory, Biologic Laboratories, Massachusetts Department of Public Health.</i>
DOROTHY ELIZABETH MC COMB	S.B., Assistant in Microbiology.
JANE DRISCOLL O'CONNOR	S.B., Assistant in Microbiology.
JANE ANN SCHOONMAKER	S.B., S.M., Assistant in Nutrition.
VALERIE SKAFF	A.B., Assistant in Tropical Public Health.
* JUDITH MILLER SPIELMAN	S.B., S.M. in Hyg., Assistant in Microbiology.
AMORITA CASTRO SUAREZ	S.B., Assistant in Behavioral Sciences.

PROFESSORS EMERITI

DONALD LESLIE AUGUSTINE	S.B., S.D., S.D. (hon.), A.M. (hon.), Professor of Tropical Public Health, Emeritus (1961).
BERTHA SHAPLEY BURKE	A.B., A.M., Associate Professor of Maternal and Child Nutrition, Emerita (1960).
PHILIP DRINKER	S.B., Chem.E., S.D. (hon.), LL.D., A.M. (hon.), Professor of Industrial Hygiene, Emeritus (1961).

HARVARD UNIVERSITY

MARTHA MAY ELIOT	A.B., M.D., L.H.D., S.D. (hon.), LL.D., Professor of Maternal and Child Health, Emerita (1960).
GORDON MASKEW FAIR	S.B., S.M. (hon.), Dr.Ing. (hon.), Dr. (hon.), Sc.D. (hon.), Abbott and James Lawrence Professor of Engineering, and Gordon McKay Professor of Sanitary Engineering, Emeritus (1965).
FRANZ GOLDMANN	M.D., Associate Professor of Medical Care, Emeritus (1958).
JOHN EVERETT GORDON	S.B., Ph.D., M.D., A.M. (hon.), F.R.C.P. (Lond.), Professor of Preventive Medicine and Epidemiology, Emeritus (1958).
ALICE HAMILTON	M.D., A.M. (hon.), S.D. (hon.), Assistant Professor of Industrial Medicine, Emerita (1935).
HUGH RODMAN LEAVELL	S.B., M.D., Dr.P.H., Professor of Public Health Practice, Emeritus (1963).
HUGO MUENCH	A.B., M.D., Dr.P.H., A.M. (hon.), Professor of Biostatistics, Emeritus (1961).
ELIZABETH PRINCE RICE	A.B., S.M., Associate Professor of Public Health Social Work, Emerita (1967).
GEORGE CHEEVER SHATTUCK	A.B., M.D., A.M. (hon.), Clinical Professor of Tropical Medicine, Emeritus (1947).
RICHARD MASON SMITH	A.B., M.D., S.D. (hon.), Thomas Morgan Rotch Professor of Pediatrics, Emeritus (1946).
HAROLD COE STUART	Litt.B., M.D., A.M. (hon.), Professor of Maternal and Child Health, Emeritus (1958).

The School and Its Facilities

The Harvard School of Public Health is primarily devoted to graduate education in public health and its aim is to provide opportunities for those who seek careers in one or more of the principal areas of public health activities — teaching, research, and the administration of health services, both nationally and internationally.

Public health evolved from the early combination of medical science and engineering for the control of environmental hazards. It has grown to embrace various facets of the biological, physical and social sciences as community aspects of health problems have become more complex and demanding. Public health now depends upon the skills and knowledge of members of several professions. The role of a graduate school of public health today is to prepare those who will be concerned with health problems which lie outside the scope of any single discipline, problems which can be solved best by the skillful cooperation of physicians, nurses, engineers, physical scientists, social scientists and other health specialists.

HISTORY OF THE SCHOOL

Activity in professional education in the field of public health had been steadily increasing in Harvard University over a period of more than two decades before the actual founding of the School, in 1922. The development was a gradual one, characterized by certain important steps, the first of which was the establishment in 1909 of the Department of Preventive Medicine and Hygiene in the Medical School — the first such department in the United States. The degree of Doctor of Public Health was first conferred in 1911. In this same year a Department of Sanitary Engineering was inaugurated in the Graduate School of Engineering. In 1913 the Department of Tropical Medicine, and in 1918 the Division of Industrial Hygiene, with clinical and laboratory facilities, were organized in the Harvard Medical School.

HARVARD UNIVERSITY

In 1913 the Harvard-Massachusetts Institute of Technology School for Health Officers was formed under the joint management of Harvard University and the Massachusetts Institute of Technology. This School operated until the fall of 1922, when it was superseded by the Harvard School of Public Health which was made possible by a generous endowment for this purpose from The Rockefeller Foundation.

When the School first opened, several departments were set up as joint departments with the Medical School, with shared facilities, faculty and budgets. This arrangement continued until 1946 when another grant from The Rockefeller Foundation provided additional space and facilities for the School of Public Health. At this time the School was separated administratively and financially from the Medical School and became an autonomous unit of Harvard University. It continues to cooperate with the Medical School in teaching and research, and has also developed close association with other schools of the University, particularly the Graduate Schools of Arts and Sciences, Government and Business Administration.

OBJECTIVES OF THE SCHOOL

The objectives of the School of Public Health are the advancement and dissemination of knowledge relating to human health and well-being. To fulfill these objectives the School provides instruction to graduate students and research fellows, conducts research, and participates in national and international health activities.

In its efforts to advance knowledge, the School is concerned with health problems of major importance to society, not only in the highly urbanized and technologically advanced regions, but also in the predominantly rural or economically disadvantaged areas of the world.

The educational program of the School provides advanced instruction in the community-oriented health sciences and in the techniques of administration for highly qualified young men and women who have potential for imaginative leadership.

In its involvement in the contemporary health problems of so-



ciety, the School collaborates with community leaders in seeking ways in which knowledge can be effectively used for the advancement of human health. The School is particularly concerned with the development of realistic social policies in relation to health problems and population growth.

DUAL ROLE OF THE SCHOOL

The School has come to recognize that it must assume the dual role of (1) a professional school that provides for the generalist a comprehensive broad program of basic knowledge in relevant health sciences and (2) a graduate school that provides advanced instruction and opportunities for independent study in depth for those students who seek to become specialists in one of the public

HARVARD UNIVERSITY

health disciplines. To fulfill these roles, two quite different degree programs are offered. One involves the professional degrees of Master and Doctor of Public Health with a wide range of required subjects. Candidates for these degrees must be graduates of approved schools of medicine, dentistry or veterinary medicine; in some cases, qualified individuals who hold doctoral degrees in the biological sciences may be admitted to the program.

The other type of program leads to the degrees of Master and Doctor of Science in Hygiene in a chosen field, and provides the opportunity to concentrate intensively in an area of special interest. The backgrounds of the candidates for these degrees range across the physical, biological and social sciences—engineers, health educators, nurses, nutritionists, social workers and statisticians. Individuals with a doctoral degree in the medical or biological sciences may elect these programs if they prefer a specialized area of study.

THE LOCATION AND BUILDINGS

Most departments of the School of Public Health are housed in four buildings: the Rotch Building at 55 Shattuck Street, the Huntington Building at 1 Shattuck Street, and two research buildings at 665 Huntington Avenue, Boston. The administrative offices are in the Rotch Building. The School's buildings are adjacent to the Harvard Medical and Dental Schools, the Children's Medical Center, the Peter Bent Brigham Hospital, and the Boston Lying-In Hospital.

OTHER FACILITIES

The facilities of the hospitals and the adjacent institutions are available to qualified students of this School, and are used in connection with the teaching of various subjects. In addition, students enrolled at the School may take courses in other departments of Harvard University, such as in the social sciences, public administration, economics, statistics and medical sciences. Certain graduate courses at the Massachusetts Institute of Technology are also open to students of this School.

The Department of Sanitary Engineering of the School is also part of the Division of Engineering and Applied Physics of the Harvard Graduate School of Arts and Sciences in Cambridge. Qualified students may register for courses given by the Division of Engineering and Applied Physics.

The School maintains a close association with a wide variety of health, medical care, and welfare organizations in Massachusetts and elsewhere. These include health departments, hospital and other medical facilities, private health and welfare agencies, and community planning groups. These organizations provide opportunities for observation and special studies, and members of their staffs are available to assist in the School's educational program. Administrative methods at local levels may be studied at first hand in some of these agencies in the Greater Boston Area.

The Institute of Laboratories of the Massachusetts Department of Public Health is engaged in a program of general interest, attracting visitors and students from various parts of the United States and from foreign countries. It not only performs a wide variety of standard bacteriological, immunological and chemical procedures, but is actively engaged in several research programs. Its Superintendent is a member of the School's Faculty. This close contact with one of the country's outstanding laboratories provides excellent opportunities for qualified students who wish to obtain intensive experience in many types of laboratory methods of particular pertinence to public health.

The clinical and laboratory facilities of the Lemuel Shattuck Hospital are available to students of the School. This hospital was built by the Department of Public Health of the Commonwealth of Massachusetts for the treatment and rehabilitation of patients with chronic diseases. Since the average duration of hospitalization is usually longer than that in general hospitals, an opportunity is afforded to study chronic disease problems not encountered in general hospitals. The training program, consultant rounds and professional staff appointments are under the aegis of the Deans of Boston University, Harvard and Tufts University Medical Schools, as well as the Harvard School of Public Health. Research laboratories at the

HARVARD UNIVERSITY

Shattuck Hospital are engaged in studies of arthritis, hematology, pulmonary function, radioisotopes, cancer therapy and chronic renal and hepatic diseases.

LIBRARIES

The library needs of the School of Public Health are served principally by the Francis A. Countway Library of Medicine, which opened its doors to readers in June 1965. The Countway Library, located at 10 Shattuck Street, combines the resources and services of the Harvard Medical Library and the Boston Medical Library. Among libraries serving medical and health-related schools, it is the largest in the country. Its recorded holdings number 410,000 volumes, and it receives 4,500 periodicals. The Countway Library is open:

8:00 A.M. to 11:30 P.M. weekdays

9:00 A.M. to 5:00 P.M. Saturdays

2:00 P.M. to 11:30 P.M. Sundays

In addition to its holdings of current books and periodicals, the Countway Library has extensive collections of historical materials, dating from the 15th Century. Its History of Medicine Department provides modern facilities for the use of these books and other rarities.

For the convenience of the several departments of the School, collections of books and journals are maintained within those departments.

All members of the University may borrow from the College Library at Cambridge. Messenger service is provided daily between the College Library, various other Harvard University Libraries, and the Countway Library.

The Boston Public Library issues cards to permanent and to temporary residents of Boston. Others may obtain cards upon payment of a small fee. Other libraries of the Boston area, notably those of the Massachusetts Institute of Technology, add to the total book and periodical resources available to students.

Through the generosity of the Harvard School of Public Health, Class of 1966, a typewriter is available in the Countway Library for the use of students.



The Countway Library of Medicine and its Periodical Room



HARVARD UNIVERSITY

The librarian of the Countway Library is Ralph T. Esterquest, and Dr. Jean Mayer represents the School of Public Health on the Library Committee.

HENRY LEE SHATTUCK INTERNATIONAL HOUSE

An important facility offered by the Harvard School of Public Health is the Henry Lee Shattuck International House, a residence for students and their families. Located at 199, 203 and 207 Park Drive in Boston, this residence comprises sixty-three individual apartments of one to four rooms—each with its own kitchenette, bath and foyer. Leased for the academic year, September 1 through June 30, the apartments are furnished except for linens, blankets and kitchen utensils. Heat, hot water, janitor service and all utilities but telephone are included in the monthly rent.

In addition, the Shattuck International House provides a playroom and an outdoor playground for the children, a laundry room, study room and modern recreation area for the adults. The recreational area consists of a library, music rooms, a large meeting room and fully equipped kitchen. Here under the sponsorship of faculty and students are held informal gatherings and scheduled events, offering many opportunities for exchange of ideas and information about the culture, geography and social structure of the many countries represented in the House and the School.

The Shattuck International House was established in 1960 by the Faculty, alumni and friends of the School for students and their families, with the hope that it would serve as a dignified residence and a congenial center for recreational and cultural activities.

Approximately 150 persons, including 50 children, from 20 to 30 countries reside in the apartments of the



Air-conditioned and fully equipped common rooms include a study room (below),



International House. About one-half of the residents are from the United States.



a large meeting room, lounges, soundproofed music rooms, and a fully equipped kitchen.



Residents enjoy a wide selection for browsing, reading and borrowing in the International House library.

The children have their own playroom indoors and a park-playground outside.



TWO

ADMISSION AND DEGREES

Application for Admission

Applicants for admission to the School must submit the following material for consideration by the Committee on Admissions and Degrees: (1) completed application form; (2) transcripts of academic record at college, graduate school and/or professional school; (3) names of at least three people, well acquainted with the applicant's previous work, from whom the School may request letters of reference.

Applicants from countries in which the language of instruction is not English must satisfy the Committee on Admissions and Degrees as to their ability to speak, read, write and understand the English language competently. In order to profit from a program of graduate study, the applicant must have sufficient knowledge of English to enable him to understand lectures in English, to participate in seminar discussions and to write examinations. In the absence of sufficient evidence from the sponsoring agency and other sources, the School may request that the applicant take and pass satisfactorily the University of Michigan English Language Test. If, upon arrival at the School, a student's command of English is found to be inadequate, he may be required to take further instruction in English.

In addition to fulfilling the specific requirements for admission to the several degree programs, applicants must satisfy the Committee as to their scholastic ability and potentiality for profitable study at a graduate level. In all instances, the final judgment as to the admissibility of an applicant rests with the Committee on Admissions and Degrees.

Preference will be given to applicants under 40 years of age; applicants over 45 years of age may be considered for admission only under exceptional circumstances.

The School is unable to accept all who apply and are eligible for admission. Therefore, persons who wish to be considered for ad-

HARVARD UNIVERSITY

mission to the 1968-69 Class are urged to submit their applications by April 1, 1968. However, applications which are completed by *July 31, 1968*, will be considered, subject to availability of space.

Admission of a candidate for one academic year does not automatically admit him in a subsequent year; re-application must be considered on the candidate's own merits in the light of the particular circumstances which govern the decisions of the Committee on Admissions and Degrees.

All inquiries and communications regarding admission should be addressed to the Director of Admissions, Harvard School of Public Health, 55 Shattuck Street, Boston, Massachusetts, 02115.

Living Expenses

Experience has shown that it is difficult for a student to get the most out of his year at the School if he has to be unduly concerned about funds to meet his expenses. Living costs in the Boston area are higher than in most areas from which students come. Therefore, the School has adopted the policy stated below in regard to applicants for admission from outside the United States.

An applicant whose financial support is not guaranteed by an official U. S. agency or foundation must submit evidence satisfactory to the School that he will have sufficient funds available in U. S. currency to enable him to pay his expenses during the academic year. The minimum amount needed by a single person, in addition to travel, is \$4,300, to cover the cost of tuition (\$2,000) and living expenses of at least \$250 a month for approximately nine months. If an applicant plans to bring his family, he must have at least \$900 more for his wife and \$450 for each dependent child, in addition to travel expense. Certification of adequate financial resources must be received by the School before the immigration form needed to obtain a visa to enter the U.S. can be issued to the student.



Courses of Study and Degrees

MASTER OF PUBLIC HEALTH DEGREE

Requirements for Admission

1. Applicants may be considered for admission as candidates for the Master of Public Health degree if they are graduates of approved schools of medicine or if they have similarly thorough preparation in the biological sciences.
2. Persons with these qualifications must satisfy the Committee on Admissions and Degrees as to their scholastic abilities and potentiality for profitable study at a graduate level.

Requirements for the Degree

1. One academic year must be spent in residence at the University. The student must complete successfully the required and elective courses to a minimum total of 40 credit units.

The first term of the Master of Public Health program consists

HARVARD UNIVERSITY

of required courses providing basic information in the sciences relevant to public health and an understanding of principles and methods. The second term is devoted largely to courses elected by the student in consultation with his Faculty adviser.

2. All candidates for the degree are required to take the following courses, unless they can demonstrate equivalent preparation:

FALL TERM

<i>Course and Title</i>	<i>Credit Units</i>
Principles of Biostatistics (Biostatistics 1a,b)	3.5
Principles of Epidemiology (Epidemiology 1a,b)	2.5
Provision of Health Services and Medical Care (Health Services Administration 1a,b)	4
Principles of Environmental Health (Environmental Health 1a,b)	4
Ecology and Epidemiology of Infectious Diseases (Microbiology and Tropical Public Health 1a,b)	4
An Introduction to Behavioral Sciences (Behavioral Sciences 1a,b)	2
Public Health Nutrition (Nutrition 1a,b)	1
Population Growth and Fertility Control (Demography and Human Ecology 1a)	1

SPRING TERM

History and Philosophy of Public Health (Interdepartmental Course 1.1d)	1
Public Health Policies (Interdepartmental Course 1.2c,d)	2

3. After the student has decided on a major field of interest or has chosen a general program he may elect to enroll in one of the courses for department majors given during the second period of the fall term. This elective course continues during the spring term in some departments.

4. The required courses and the elective departmental course comprise the total program for the fall term. *A candidate for the degree of Master of Public Health may not elect any additional*

courses during this term unless excused from one or more of the required courses.

5. The balance of the Master of Public Health program in the spring term is devoted to elective courses, seminars and tutorial work, chosen by the student on the basis of his field of interest. These courses are described on pages 65-144. Certain courses in other graduate schools of Harvard University and in the Massachusetts Institute of Technology are open to full-time students in the Harvard School of Public Health.

6. No formal classes are scheduled during the one-week period from January 29 to February 3, 1968. This time is available to study data processing in the Department of Biostatistics and for supervised special studies or for field observations. All candidates for the Master of Public Health degree are required to register for work during this week under Biostatistics 13e or 14e, Course 17e (Tutorial) or Course 30e (Field Study). Opportunities available are listed under the various Departments. One unit of credit will be given for satisfactory completion of the week's assignment.

MASTER OF SCIENCE IN HYGIENE DEGREE

(With Designation of a Field of Concentration)

This degree is granted on fulfillment of a program of advanced work in one of the basic disciplines of public health. The courses taken must form an integrated plan of study in one branch of knowledge and allied subjects.

Requirements for Admission

Applicants may be considered for admission as candidates for the Master of Science in Hygiene degree, on the basis of a one-year or a two-year program, if they meet the requirements in one of the categories listed below. They must also satisfy the Committee on Admissions and Degrees and the department within which they choose to specialize as to their potentiality for successful study at a graduate level within the School.

One-year Program

1. Applicants who are graduates of approved schools of medicine or who have a thorough preparation of a similar nature in the biological sciences.
2. Applicants who have a doctoral degree from an approved school in a discipline related to public health.
3. Applicants in public health specialties (social workers, nurses, health educators, nutritionists) who have obtained a master's degree with honor grades in their special fields and have had at least two years' acceptable experience in a public health activity.
4. Applicants in industrial hygiene, air pollution control, radiological health and public health engineering who meet certain requirements with respect to academic background and experience. Normally this includes receipt of a bachelor's degree with honor grades (including adequate undergraduate training in physics, biology, chemistry and mathematics) supplemented by at least two years of relevant professional experience in the chosen field of specialization.

Two-year Program

Applicants with a bachelor's degree obtained with honors in the natural sciences who wish to specialize in one of the laboratory sciences or statistics.

Under certain circumstances, a year of graduate work in another approved institution may be accepted as the first year of this program.

Requirements for the Degree

1. The student must spend a minimum of one year in residence at the University and must complete successfully a program of at least 40 credit units. Candidates in the two-year program must obtain at least 80 credit units.
2. All candidates for the degree are required to take Biostatistics 1a,b and Epidemiology 1a,b, unless they can demonstrate equivalent preparation. Candidates who do not have a background in medicine or biology are required to take Biostatistics and Epidemiology 7a,b (see page 68). The remainder of the program is devoted to

courses which may be prescribed by the department of concentration and to elective courses in the primary and related fields of interest. These courses are described on pages 65-144. Courses offered by other Faculties of the University are also available.

3. No formal classes are scheduled during the one-week period from January 29 to February 3, 1968. This time is available to study data processing in the Department of Biostatistics and for supervised special studies or field observations. All candidates for the Master of Science in Hygiene degree are required to register for work during this week, under Biostatistics 13e, 14e, or Course 17e (Tutorial) or Course 30e (Field Study). Opportunities available are listed under the Departmental course offerings. One unit of credit is given for satisfactory completion of the week's assignment.

MASTER OF INDUSTRIAL HEALTH

A program of courses leading to a Master of Industrial Health degree was established in 1949, in recognition of the need for post-graduate training in the public health disciplines which are relevant to the development of preventive medical programs in industry.

Requirements for Admission

Candidates for this degree must be graduates of an approved school of medicine and must also satisfy the Committee on Admissions and Degrees as to their scholastic abilities and potentiality for profitable study at a graduate level. Students from the United States must have completed an internship of at least twelve months in a hospital approved by the American Medical Association.

Requirements for the Degree

1. One academic year must be spent in residence at the University.
2. The student must complete successfully the required and elective courses to a minimum total of 40 credit units. All candidates for the degree are expected to take the following courses unless they can demonstrate equivalent preparation:

Course	Credit units
Biostatistics 1a,b (Principles of Biostatistics)	3.5
Epidemiology 1a,b (Principles of Epidemiology)	2.5

HARVARD UNIVERSITY

<i>Course</i>	<i>Credit Units</i>
Environmental Health 1a,b (Principles of Environmental Health)	4
Environmental Health 3a,b (Radioactivity and Radiation Protection)	4
Industrial Hygiene 3c,d (Basic Problems in Occupational Health and Industrial Environments)	6
Total	20

In addition, the student may select from the general curriculum courses of interest to him, or do special work subject to approval of the Heads of the Departments of Industrial Hygiene or Physiology.

3. No formal classes are scheduled during the one-week period from January 29 to February 3, 1968. This time is available to study data processing in the Department of Biostatistics and for supervised special studies or field observations. All candidates for the Master of Industrial Health degree are required to register for work during this week, under Biostatistics 13e, 14e, or Course 17e (Tutorial) or Course 30e (Field Study). Opportunities available are listed under the Departmental course offerings. One unit of credit will be given for satisfactory completion of the week's assignment.

DOCTOR OF PUBLIC HEALTH

For the degree of Doctor of Public Health the student must complete an approved program of independent and original investigation in a special field and must present the results of this research in an acceptable thesis.

Requirements for Admission

1. An applicant for admission to candidacy for this degree must be either (a) a graduate of an approved school of medicine, dental medicine or veterinary medicine, or (b) the holder of another doctoral degree in one of the basic sciences related to public health. In exceptional cases, an individual lacking a previous doctoral degree

may be admitted if he has displayed outstanding ability in previous academic work and in practical public health experience.

2. The applicant must hold the degree of Master of Public Health or its equivalent from an approved institution and must have demonstrated potential ability to undertake original investigation in a special field.

3. Admission to doctoral candidacy is considered provisional until the candidate has passed the oral qualifying examination.

DOCTOR OF SCIENCE IN HYGIENE

(With Designation of a Field of Concentration)

This degree is granted on successful completion of a program of independent and original research in one of the basic disciplines of public health, and the presentation of this research in an acceptable thesis.

Requirements for Admission

Candidates for the degree of Doctor of Science in Hygiene must hold the degree of Master of Science in Hygiene or its equivalent and must indicate ability to undertake original investigation in a special field.

Admission to doctoral candidacy is considered provisional until the candidate has passed the oral qualifying examination.

REQUIREMENTS FOR DOCTORAL DEGREES

Residence

The student is required to complete a minimum of one academic year in residence. However, the required work and preparation of an acceptable thesis normally require two full years and frequently longer.

Doctoral Program Adviser

After the student enrolls in the School as a provisional doctoral candidate, a Doctoral Program Adviser is appointed by the Department of concentration. This Adviser keeps the student informed of all procedures and requirements for the degree, advises him

HARVARD UNIVERSITY

about proper courses to be taken, decides, together with the Department, when the student is prepared to take the qualifying examination, and supervises the thesis work.

Foreign Language Requirement

The candidate must possess a reading knowledge of two languages, other than his native tongue, which will enable him to make use of the literature pertinent to his professional interests. Usually these languages are chosen from the following four—German, French, Russian and English—with the restriction that the student may not utilize the major language of scientific communication in his native country in meeting the requirements. A language other than the four listed above, which meets the special needs of the candidate's research program may be substituted with the consent of the Department of concentration and the Committee on Admissions and Degrees. One language examination must be passed before the candidate is permitted to take the qualifying examination. The second language examination must be passed before the appointment of the Readers of the Thesis. The candidate is urged to satisfy the language requirements as early as possible.

Qualifying Examination

When the Adviser and the Department judge that the candidate is prepared, an oral qualifying examination is conducted by Special Examiners, who examine in depth in the area of the candidate's general academic knowledge, his major interest, and related fields. This examination should be taken within six months, but no later than one year, after admission as a provisional doctoral candidate.

Evaluation of Candidate's Progress

After the candidate has passed the qualifying examination, two Faculty members are appointed to aid the Adviser in the periodic evaluation of the student's progress.

Deadline Dates for Thesis

After the Adviser and Department deem the thesis completed, it shall be typed in final form. Three unbound copies must be deposited

in the Registrar's Office *before January first*, for degrees to be awarded at midyear, and *before April fifteenth* for degrees to be awarded in June. The thesis must be accompanied by 100 copies of a summary not exceeding 1200 words in length, which shall indicate clearly the purpose, methods, and results of the investigation.

Acceptance of the Thesis and Final Examination

When the thesis is submitted, three Readers are appointed to determine if it is acceptable. If it is approved, a final examination is given at which the student defends his thesis before members of the Faculty, including the Readers. Ordinarily, the thesis must be approved within three years of the date of the qualifying examination.

A detailed statement of procedures and requirements for the doctoral program and for the preparation of the thesis may be obtained from the Registrar after the student has been admitted to provisional candidacy for the degree.

Grading System

The grading system in effect at the School of Public Health for the Academic Year 1967-68 is as follows: All courses are graded as "Satisfactory" or "Unsatisfactory." *Satisfactory* indicates performance of sufficiently high quality for credit to be assigned. A grade of *Unsatisfactory* means that no credit is given for the course. If a student is graded as *Unsatisfactory* the following procedure is to be followed:

(a) *Unsatisfactory* in courses required by the Faculty and the Department of concentration:*

The Committee on Admissions and Degrees, in consultation with the Instructor and the Faculty Adviser, is to decide whether or not the student may be given a re-examination;

(b) *Unsatisfactory* in courses not required for a particular degree: No re-examination is to be given if the student has enough credits for the degree. This decision must be made within eight weeks after the end of the course. A re-examination may be given, as under (a) above, if credit is needed for the degree.

* A Department may require specific courses for students in a Master of Science in Hygiene, Master of Industrial Health, or doctoral program in addition to those required by the School for the particular degree. Such courses would be classified as "required" courses.

Residency Programs

The School offers training programs leading to certification by the American Board of Preventive Medicine in the following areas:

Occupational Medicine

General Preventive Medicine, in the specialty areas of

Epidemiology

International Health

Health Services Administration

Residencies in Public Health are also available through the Massachusetts Department of Public Health.

A residency program in Dental Public Health leading to certification by the American Board of Dental Public Health is available through the School of Dental Medicine in cooperation with the School of Public Health and the Massachusetts Department of Public Health.

These programs are three years in length and consist of one or two years of study leading to the graduate degree, Master of Public Health, or Master of Science in Hygiene, and one or two years of more advanced work including supervised experience which may or may not be part of a doctoral program. The third year may be devoted to training in an approved industry, organization, or institution consistent with the speciality area. In the case of the specialty of "Public Health" the second and third years can be taken under the auspices of the Massachusetts Department of Public Health with the School of Public Health formally serving as a resource to the resident and to the State residency training program.

Further details on the residency programs, including availability of financial support, can be obtained through the Registrar or the Departments of the School concerned, or through the Massachusetts Department of Public Health for the residency in Public Health.

Special Students

Subject to availability of space, the School may accept a few students, on a full-time or a part-time basis, who are not degree candidates, but who are interested in taking one or more courses in a special field. Procedures and requirements for the admission of such students are the same as for degree candidates. Special students who later wish to be admitted to degree candidacy will be considered on the same basis as other applicants for admission. Admission as a special student carries with it no commitment to accept the applicant as a degree candidate.

Degrees in Engineering

Graduates of engineering colleges or scientific schools of recognized standing who are interested in the environmental health aspects of public health may be admitted to the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences as candidates for the degree of Master of Science or Doctor of Philosophy. They may elect appropriate courses in the School of Public Health as a part of the program for these degrees.

For further information write to the Committee on Admissions, Graduate School of Arts and Sciences, Holyoke Center, 75 Mt. Auburn Street, Cambridge, Massachusetts, 02138.



<< President Pusey in the academic procession
on Commencement Day

THREE

CONTENT OF COURSES

Department of Biostatistics

ROBERT B. REED, A.B., A.M., PH.D., A.M. (hon.), Professor of Biostatistics and Head of the Department

JANE WORCESTER, A.B., DR.P.H., Professor of Biostatistics and Epidemiology

JACOB J. FELDMAN, PH.D., Associate Professor of Biostatistics

*YVONNE M. M. BISHOP, B.A., S.M. IN HYG., PH.D.; Assistant Professor of Applied Biostatistics; *Statistician to the Children's Cancer Research Foundation*

MARGARET E. DROLETTE, A.B., M.P.H., PH.D., Assistant Professor of Biostatistics

DAVID M. HEER, A.B., A.M., PH.D., Assistant Professor of Biostatistics and Demography

OLLI S. MIETTINEN, M.D., M.P.H., Assistant Professor of Epidemiology and Biostatistics

*PAUL M. DENSEN, A.B., S.D., Visiting Lecturer on Biostatistics; *Deputy Commissioner, New York City Department of Health*

MARY L. NEW, S.B., M.P.H., Research Associate and Lecturer in Biostatistics

BRADLEY EFRON, S.B., S.M., PH.D., *Visiting Lecturer on Statistics, Department of Statistics, Harvard University*

The teaching aims of the Department may be divided very generally into three categories:

First, it is essential for workers in all branches of public health to be able to draw justified conclusions from numerical data and to base logical action on these conclusions. This applies to the administrator who must evaluate problems and the results of his activities, as well as to the epidemiologist and the research worker who must apply statistical techniques to their laboratory and field problems. The required course in Biostatistics is therefore designed to give a minimum command of simple statistical methodology to all students.

Second, it is essential for field and laboratory researchers to be able to use statistical methods in planning and analyzing their experiments and problems. Elective courses are designed to provide an introduction to methodology in this area. These courses are adapted to the needs of students of this School, many of whom have broad backgrounds in biological sciences while few have extensive preparation in mathematics. A minimum of mathematical

* Part-time in the School of Public Health.

HARVARD UNIVERSITY

exposition is therefore included in courses intended for students in these categories. Instead the emphasis is on understanding the statistical procedures and the ability to carry out indicated analyses effectively.

Third, there is a smaller group of students particularly interested in pursuing further work along mathematical lines. Their requirements are fulfilled, on the one hand, by the provision of advanced and seminar courses in the Department; on the other, by the offerings of the Department of Statistics in the Graduate School of Arts and Sciences.

Training in the use of data processing equipment is available in the Data Processing Center operated by the Department. This Center is equipped with an IBM 1620 Computer and basic punch card machines, including a 101 Statistical Sorter. The University Computer Center, located in Cambridge and equipped with an IBM 7094 Computer, also provides an opportunity to study computer techniques. A teletype connection to the time-sharing system at the Computing Center is available for students at the School.

Any course in the Department is open to any student who meets the prerequisites stated in the course description. Candidates for the Master of Public Health degree who elect to concentrate in Biostatistics are normally expected to take the following courses in addition to satisfying the formal course requirements for the degree:

Biostatistics 2b,c,d

Biostatistics 3c,d

Biostatistics and Behavioral Sciences 5c,d

Epidemiology and Biostatistics 6c,d

Biostatistics 1a,b. Principles of Biostatistics

Lectures and discussions. *Two one-hour sessions each week, first and second periods.*

Laboratory. *One three-hour session each week, first and second periods.*
Staff of the Department.

Credit 3 units.

Required of Master of Public Health and Master of Science in Hygiene candidates.

Lectures, discussions and laboratory exercises introduce the student to demographic concepts: the structure of the population and the use of the life table; the nature and composition of rates and their use from administrative and epidemiological points of view. The course forms an introduction to the theory of measurements and distributions, including the testing of significance of differences and the interaction of variables. Finally, the student is introduced to basic concepts of probability and association, sampling techniques and construction of controlled experiments such as clinical trials.

Biostatistics 2b,c,d. Design of Investigations

Seminars. *One two-hour session each week, second, third, and fourth periods.* Staff of the Department.

Credit 3 units.

This course is for students with a major interest in biostatistics. Participants select a biostatistical problem in apparent need of investigation, and prepare and present for group discussion a summary of the present status of knowledge of the problem and the design of a study directed towards advancement of present knowledge. Given in conjunction with Epidemiology 2b,c,d.

Enrollment is subject to the approval of the Head of the Department.

Biostatistics 3c,d. Statistical Methods in Research

Lectures, discussions and laboratory. *Two three-hour sessions each week, third and fourth periods.* Dr. REED, Dr. WORCESTER and Dr. DROLETTE.

Credit 4 units.

This course, a continuation of Biostatistics 1a,b, introduces the student to technical statistical procedures important in problems of laboratory and field research. Topics included are further considerations of probability and correlation, together with an introduction to procedures used in the planning of experiments, including variance analysis, non-parametric methods, dosage response and maximum likelihood.

Prerequisites: Basic preparation in statistics and epidemiology.

Biostatistics 4c,d. Mathematical Foundations of Biostatistics

Lectures. *One two-hour session each week, third and fourth periods.* Dr. DROLETTE.

Credit 2 units.

The material covered includes mathematical descriptions of commonly used distributions, standard procedures for estimating the moments of a distribution and mathematical foundations of statistical inference, including the Neyman-Pearson lemma, the likelihood ratio, the central limit theorem and power.

Prerequisite: A course in elementary calculus.

Biostatistics and Behavioral Sciences 5c,d. Research Methods in Planning and Evaluation

Lectures and discussions. *Two two-hour sessions each week, third and fourth periods.* Dr. REED, Dr. FELDMAN and Staff of the Behavioral Sciences Department.

Credit 4 units.

HARVARD UNIVERSITY

The focus of this course is on population - survey and related social-research techniques as they apply to problems of health program planning and evaluation. Various constituent elements of the investigative process, including research design, sample selection, questionnaire construction, and the reduction and interpretation of data are subjected to critical examination. As laboratory exercises, students employ the methodology covered by the course in developing research plans and instructions which are relevant to the problems of an ongoing health program. These plans and instruments are discussed in seminar sessions.

Enrollment is limited and is subject to the approval of the Instructor.

Epidemiology and Biostatistics 6c,d. Research Methods in Epidemiology

Lectures. One two-hour session each week, third and fourth periods. Dr. WORCESTER and Staffs of the Departments of Epidemiology and Biostatistics.

Credit 2 units.

Primarily for Master of Science in Hygiene and doctoral candidates in Epidemiology or Biostatistics.

This course is concerned with statistical and other problems commonly encountered in epidemiologic research. Examples include assessment of data quality, misclassification, nonresponse, population sampling, matching, and analytic techniques for birth order effects, time-space clusters, cyclical variations, and measurement of survival.

Prerequisite: Enrollment in Biostatistics 3c,d.

Enrollment is subject to the approval of the Instructor.

Biostatistics and Epidemiology 7a,b. Principles

Lectures and discussions. One one-hour session each week, first and second periods. Instructor to be announced.

Credit 1 unit.

Biostatistics and Epidemiology are required of Master of Science in Hygiene candidates. This requirement is met by enrollment in Biostatistics 1a,b (3 units) and Epidemiology 1a,b (2.5 units). In addition, those candidates without a background in medicine or biology must take Biostatistics and Epidemiology 7a,b (1 unit) which meets one hour each week in the fall term. This additional session provides supplementary information and an opportunity to discuss the material presented in the other two courses.

Biostatistics 10c or d. Advanced Topics in Biostatistics

Lectures. One two-hour session each week, third or fourth periods. Dr. REED.

Credit 1 unit.

To be omitted in 1967-68.

The subject matter in this course varies from year to year. It deals intensively with a topic touched upon in Biostatistics 1a,b or 3c,d.

The course is intended for advanced students and departmental majors.

Biostatistics 11a,b,c,d. Teaching of Biostatistics

Time and credit to be arranged. Staff of the Department.

This course is primarily used for students majoring in Biostatistics who act as laboratory instructors in Biostatistics 1a,b as part of their training. It may also be used for other teaching experiences.

Biostatistics 12a,b,c,d. Biostatistical Consultation

Time and credit to be arranged. Staff of the Department.

This course provides an opportunity for students majoring in Biostatistics to participate in the consulting work carried on by the Department faculty.

Biostatistics 13e,f. Introduction to Data Processing

One full week is offered twice a year, January 29—February 3, 1968 or June 3—8. Staff of the Data Processing Center.

Opportunity is provided for studying the use of the equipment of the School's Data Processing Center.

Biostatistics 14e,f. Introduction to Computer Programming

One full week is offered twice a year, January 29—February 3, 1968 or June 3—8. Staff of the Data Processing Center.

Emphasis is placed on instruction in Fortran programming and in the use of the IBM 1620 computer.

Biostatistics 15a,b,c,d. Advanced Data Processing

Individual work may be arranged to suit the need of the student. Staff of the Data Processing Center.

Prerequisite: Biostatistics 13 and/or Biostatistics 14, or equivalent.

Biostatistics 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged. Staff of the Department.

An opportunity for tutorial work at master's level is given interested students. This involves not only work in statistical fields, but can include problems arising in the course of special programs in other departments. Schedules and credit may therefore be arranged jointly with such other departments.

HARVARD UNIVERSITY

Biostatistics 20. Research

Individual guided research at doctoral level, for candidates for the Doctor of Public Health, Doctor of Science in Hygiene or other doctoral degrees. The work may be part of the program for a doctorate in this Department or may be integrated with doctoral research in other departments.

Students may register for Biostatistics 11, Biostatistics 12, Biostatistics 15, Biostatistics 17 or Biostatistics 20 for a maximum of 12 credit units in the summer term.

Department of Epidemiology

BRIAN MACMAHON, M.D., PH.D., D.P.H., S.M. IN HYG., Professor of Epidemiology and Head of the Department

JANE WORCESTER, A.B., DR.P.H., Professor of Biostatistics and Epidemiology

HERBERT L. LEY, JR., M.D., M.P.H., Associate Professor of Epidemiology and Microbiology (absent 1967-68)

*THOMAS F. PUGH, M.D., M.P.H., Associate Professor of Applied Epidemiology; *Director, Division of Medical Statistics and Research, Massachusetts Department of Mental Health*

THEODOR ABELIN, M.D., M.P.H., Assistant Professor of Epidemiology

MANNING FEINLEIB, A.B., M.D., M.P.H., DR.P.H., Assistant Professor of Epidemiology (absent 1967-68)

OLLI S. MIETTINEN, M.D., M.P.H., M.Sc., Assistant Professor of Epidemiology and Biostatistics

ASCHER J. SEGALL, M.D., M.P.H., DR.P.H., Assistant Professor of Epidemiology

*GEORGE B. HUTCHISON, A.B., M.D., M.P.H., Visiting Lecturer on Epidemiology; *Staff Member, Michael Reese Hospital and Research Institute, Chicago*

*ROBERT W. MILLER, A.B., M.D., M.P.H., DR.P.H., Visiting Lecturer on Epidemiology; *Chief, Epidemiology Branch, National Cancer Institute*

*RALPH S. PAFFENBARGER, JR., A.B., B.M., M.D., DR.P.H., Lecturer on Epidemiology; *Chief, Field Epidemiological Research Section, National Heart Institute, Framingham*

*A. MICHAEL DAVIES, M.B., CH.B., M.D., Consultant on Epidemiology; *Head, Department of Medical Ecology, Hebrew University Medical School, Jerusalem*

STELLA B. YEN, M.D., M.P.H., Research Fellow in Epidemiology

HERMANN LISCO, M.D., *Lecturer on Pathology, Harvard Medical School*

ROBERT L. GLASS, S.B., D.M.D., M.P.H., DR.P.H., *Associate Clinical Professor of Ecological Dentistry, Harvard Dental School*

MARISE S. GOTTLIEB, A.B., M.D., M.P.H., *Research Fellow in Medicine, Harvard Medical School*

The major objective of the Department of Epidemiology is to provide opportunities for training and experience in the application of epidemiologic

* Part-time in the School of Public Health.

HARVARD UNIVERSITY

research methods to the investigation of diseases of unknown etiology. Emphasis is on the cardiovascular and mental disorders, the malignant neoplasms, abnormalities of reproduction and development, and other major diseases for which preventive measures are still unknown or inadequate.

A one-year research-training program leads to the degree of Master of Science in Hygiene in the field of Epidemiology. This program usually includes the following courses: Epidemiology 1a,b, 2b,c,d, 3c,d and 8a,b; Biostatistics 1a,b, 3c,d and 13e; and Epidemiology and Biostatistics 6c,d—a total of 20 credit units. The remainder of the credits required for the degree may be taken as additional formal courses in areas of special interest, or as supervised research (Epidemiology 17a,b,c,d).

For qualified students the period of research training may be extended by admission to either of the doctoral programs offered by the School, by admission to special student status, or through other individual arrangements. During the second and subsequent years of training, students whose first year was in the Master of Public Health program are expected to enroll in any of the above courses which were not taken in their first year. Other courses in this or other schools of the University may also be elected. However, most of the training period beyond the master's degree is occupied by the completion of a research project and, in the case of doctoral candidates, preparation of a thesis. Doctoral candidates must plan at least two years in residence beyond completion of the master's degree.

Epidemiology 1a,b is required for students in the general Master of Public Health program of the school. Epidemiology 3c,d, 5c and 2b,c,d are departmental courses that can also be considered by Master of Public Health candidates as components of the elective part of that program.

A three-year residency in the Department of Epidemiology has been approved as satisfying residency requirements of the American Board of Preventive Medicine for certification in General Preventive Medicine. Requirements of the approved residency and of the School's degree programs may be satisfied simultaneously.

Fellowships for research training programs are provided in a U.S. Public Health Service training grant to the Department. The Public Health Service also has a program of traineeship grants for support of residents in approved preventive medicine residencies. Traineeships from both sources are restricted to U.S. citizens or physicians who have been admitted to the United States for permanent residence. In both cases, applications should be submitted through the Department of Epidemiology.

Epidemiology 1a,b. Principles of Epidemiology

Lectures and discussions. Two one-hour sessions each week, first period; one two-hour and one one-hour session each week, second period. Dr. MACMAHON and Dr. ABELIN.

Credit 2.5 units.

Required of all Masters' degree candidates.

Lectures and discussions on the principles, purposes and methods of epidemiology: descriptive and analytic epidemiology; case history, cohort, and experimental studies; measurement of disease frequency, and comparison of risks in different types of investigation. Principles are illustrated by reference to classic epidemiologic investigations of infectious and non-infectious diseases.

Epidemiology 2b,c,d. Design of Investigations

Seminars. *One two-hour session each week, second, third, and fourth periods.* Staff of the Department.

Credit 3 units.

This course is for students with a major interest in epidemiology. Participants select an epidemiologic problem in apparent need of investigation, and prepare and present for group discussion a summary of the present status of knowledge of the problem and the design of a study directed towards advancement of present knowledge. Given in conjunction with Biostatistics 2b,c,d.

Enrollment is subject to the approval of the Head of the Department.

Epidemiology 3c,d. Epidemiology of Non-Infectious Diseases

Lectures. *Two one-hour sessions each week, third period; one two-hour session each week, and one one-hour session each week, fourth period.* Dr. MACMAHON and Staff of the Department.

Credit 2.5 units.

This course is designed to serve both Master of Public Health and Master of Science in Hygiene candidates.

A systematic review of existing knowledge of the epidemiology of diseases of unknown etiology or associated with etiologic factors which are not at present known to be of infectious nature. Emphasis is on the more common conditions, including the degenerative and malignant diseases. Attention is given to the methodologic difficulties associated with the epidemiologic investigation of chronic diseases.

Epidemiology and Microbiology 5c. Epidemiologic Problems in Infectious Diseases

Conferences, seminars, laboratory exercises. *Two two-hour sessions each week, third period.* Staffs of the Department.

Credit 2 units.

This course, given by the staffs of the Departments of Microbiology, Epi-

HARVARD UNIVERSITY

demiology and Tropical Public Health, provides experience in solving epidemiologic problems in communicable diseases.

Epidemiology and Biostatistics 6c,d. Research Methods in Epidemiology

Lectures. *One two-hour session each week, third and fourth periods.* Dr. WORCESTER and Staffs of the Departments of Epidemiology and Biostatistics.

Credit 2 units.

Primarily for Master of Science in Hygiene and doctoral candidates in Epidemiology or Biostatistics.

This course is concerned with statistical and other problems commonly encountered in epidemiologic research. Examples include assessment of data quality, misclassification, nonresponse, population sampling, matching, and analytic techniques for birth order effects, time-space clusters, cyclical variations, and measurement of survival.

Prerequisite: Enrollment in Biostatistics 3c,d. Admission is subject to the approval of the Instructor.

Biostatistics and Epidemiology 7a,b. Principles

Lectures and discussions. *One one-hour session each week, first and second periods.* Instructors to be announced.

Credit 1 unit.

Biostatistics and Epidemiology are required of Master of Science in Hygiene candidates. This requirement is met by enrollment in Biostatistics 1a,b (3 units) and Epidemiology 1a,b (2.5 units). In addition, those candidates without a background in medicine or biology must take Biostatistics and Epidemiology 7a,b (1 unit) which meets one hour each week in the fall term. This additional session provides supplementary information and an opportunity to discuss the material presented in the other two courses.

Epidemiology and Microbiology 8a,b. Human Genetics

Lectures. *Two one-hour sessions each week, first and second periods.* Dr. MIETTINEN and Dr. CHANG.

Credit 2 units.

Introductory lectures (12 hours) review current concepts on basic characteristics of genes, regulation of gene action, and the mechanisms of genetic variation. The remainder of the course is devoted to description of methods for investigating genetic problems in man.

Epidemiology 9d. Epidemiology of Oral Diseases

Lectures and seminars. *One two-hour session each week, fourth period.* Dr. GLASS.

Credit 1 unit.

This course is primarily for dentists in the dental epidemiology and dental public health training programs. It includes a systematic review of current knowledge of the epidemiology of oral diseases and review of methodologic problems in surveys and clinical trials in dental epidemiology.

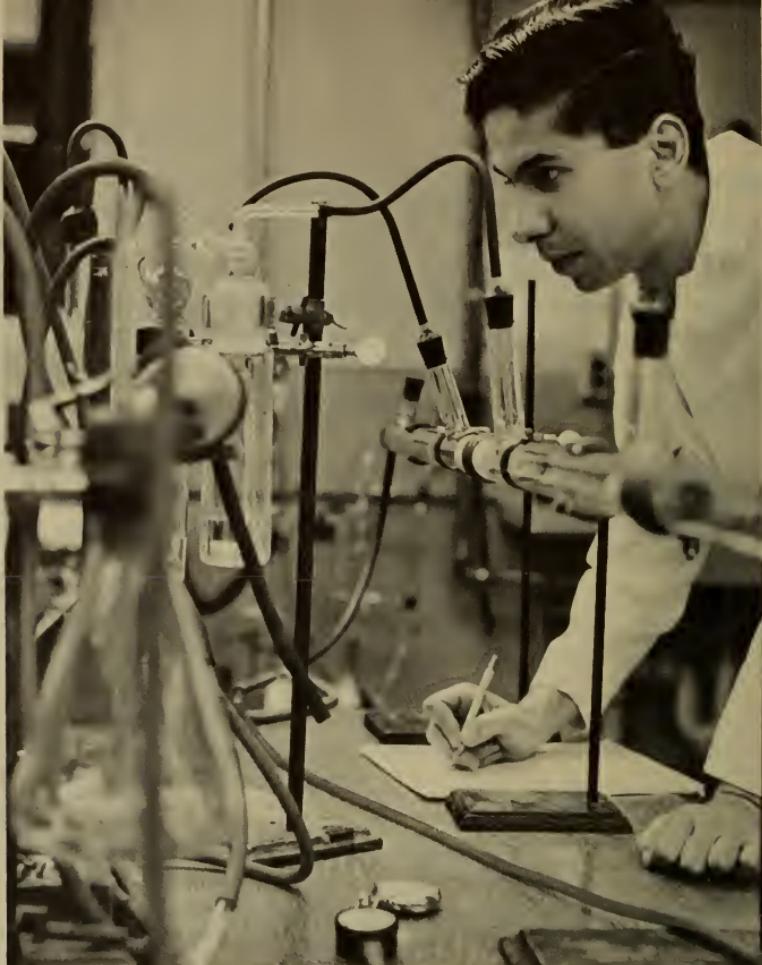
The topics to be covered are dental caries, fluoridation, oral cancer, periodontal diseases, oral congenital malformations, indices of oral health, survey methodology, and design of clinical trials in oral diseases.

Epidemiology 17. Introduction to Research

Participation in departmental research in close association with a staff member. Time and credit are to be arranged with the Head of the Department.

Epidemiology 20. Research

Research for doctoral candidates.



The Kresge Center for Environmental Health

**James L. Whittenberger, S.B., M.D., A.M., (hon.), Director
Dade W. Moeller, S.B., S.M., Ph.D., Associate Director**

This Center is based primarily at the School of Public Health and includes research and educational programs of the Departments of Industrial Hygiene, Physiology, and Sanitary Engineering, and environmental health-related activities in other parts of the University.

Cutting across administrative boundaries are interdisciplinary programs in several of the component fields of environmental health; these currently include the following:

1. Aerospace Health and Safety

2. Air Pollution Effects and Control
3. Environmental Biology
4. Environmental Toxicology
5. Human Factors — Accident Prevention
6. Industrial Hygiene
7. Occupational Medicine
8. Radiological Health
9. Respiratory Physiology
10. Sanitary Engineering
11. Solid Waste Disposal
12. Water and Soil Chemistry
13. Water Resource Engineering

In addition to these programs, the Center encourages the development of individual plans of study which extend to other parts of Harvard University where courses have relevance to environmental health; for example, in city and regional planning and public administration. The Center also promotes the development of seminar courses which cross disciplinary boundaries.

Several degree programs are available in environmental health; the formal requirements are described in other sections of the catalogue. In general, students interested in problems of water quality and water resources enroll for a Master of Science or Ph.D. program in the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences in Cambridge.

Students interested in such fields as air quality, industrial hygiene, radiological health, and toxicology ordinarily enroll in a Master of Science in Hygiene or Doctor of Science in Hygiene program at the School of Public Health. Physicians are eligible for any of the degrees offered by the School of Public Health.

Additional information is given in the departmental listings.

Center Courses

Environmental Health 1a,b. Principles of Environmental Health

Lectures and demonstrations. *Two one-hour sessions and one two-hour session each week, first and second periods.* Dr. WHITTENBERGER, Dr. MOELLER, and Staff of the Center.

Credit 4 units.

This course is required of Master of Public Health and Master of Industrial Health candidates and is elective for other students.

Environmental health problems are considered primarily from two points of view:

HARVARD UNIVERSITY

1. The state of knowledge concerning the biological effects of physical, chemical, and biological environments, including pollution. Direct effects on health, as well as other consequences of concern to man, are dealt with.

2. The measurement of environmental quality, and the selection of methods for controlling undesirable or potentially harmful attributes of the environment. The applications of economic analysis and decision theory to environmental systems are developed.

Specific topics include water supply and pollution, solid waste problems, air pollution, public health aspects of ionizing radiation, food sanitation, accident prevention, the legal protection of environmental quality, and interrelationships of the environmental problems which beset a highly urbanized and technologically developed society.

Environmental Health 2b,c,d. Aviation Health and Safety

Seminars. *One two-hour session each week, second, third and fourth periods.* Dr. McFARLAND.

Credit 3 units.

The purpose of these seminars is to integrate the work in the basic courses of public health and preventive medicine with the specialized problems of aviation health and safety. Lectures and discussions are arranged throughout the year, led by the students, the Instructor, and various biological and medical specialists in the University. Visiting lecturers from other universities and research centers also participate in the seminar.

Enrollment is subject to the approval of the Instructor.

Environmental Health 3a,b. Introduction to Radioactivity and Radiation Protection

Lectures, laboratories, and field trips. *One one-hour session and one four-hour session each week, first and second periods.* Dr. SHAPIRO and Dr. REIST.

Credit 4 units.

This course is an introduction to the health and safety problems accompanying the use of ionizing radiations. Laboratory exercises provide an introduction to radiation sources, techniques for their measurement, and the safe use of radionuclides. Lecture topics include the elements of radioactivity; interaction of radiations with matter; calculation of radiation dose rates and shielding; neutron activation; radiation protection standards; major sources of population exposure including background radiation, medical X-rays, and fallout from nuclear detonations; radiation protection procedures.

Environmental Health 4a,b. Problems in Radiation Dosimetry

Lectures. *Two one-hour sessions each week, first and second periods; laboratory, one three-hour session each week, first period.* Dr. SHAPIRO.

Credit 3 units.

This course deals with the experimental and theoretical methods of evaluating radiation fields and determining radiation dose rates. Special dosimetry problems for study in the laboratory are selected from the fields of health physics, nuclear engineering, and nuclear medicine.

Prerequisite: Environmental Health 3a,b. It is also recommended that Industrial Hygiene 7c,d, Radiation Protection Engineering and Physiology 7c,d, Radiation Biology be taken before this course.

Environmental Health 5c,d. Occupational Medical Seminars

Seminars, Lemuel Shattuck Hospital. *One two-hour session each week, third and fourth periods. Dr. TYLER.*

Credit 2 units.

The seminars emphasize the effect that non-occupational disease may have on the working capacity of the individual, the criteria for returning such an individual to work, and the rehabilitation program involved.

The seminars are limited to physicians and are not offered if less than four enroll.

Environmental Health 6c,d. Occupational Medical Clinics

Clinics, Massachusetts General Hospital. *One two-hour session each week, third and fourth periods. Dr. FERRIS and associates.*

Credit 2 units.

These clinics are concerned with diseases due to occupation, such as silicosis, beryllium intoxication, coal miner's pneumoconiosis, and lead poisoning. Special clinics are held in ophthalmology and dermatology.

The clinics are limited to physicians and are not offered if less than four students enroll.

Environmental Health 8c,8d. Human Factors in Occupational Performance and Safety

Lectures and demonstrations. *One two-hour session each week, third period; one two-hour session each week, fourth period. Dr. McFARLAND.*

Credit 1 unit in each period.

In the third period, the lectures and discussions emphasize the application of experimental psychology, anthropology, and biotechnology to the problems of occupational performance and adjustment. Consideration is given to the matching of psychological and physical abilities to job requirements. Emphasis is placed on the importance of designing equipment and work practices in terms of human capabilities and limitations, including those related to fatigue, aging, and environmental stress. In the fourth period the

HARVARD UNIVERSITY

lectures and seminars explore interdisciplinary methods in the analysis and prevention of accidents and injuries. While the major emphasis is on occupational safety, the prevention of other types of accidents is also included.

With the approval of the Instructor, either period may be taken separately.

Environmental Health 9d. Occupational Medicine

Lectures. *Two two-hour sessions each week, fourth period.* Dr. FERRIS and Dr. WILKINS.

Credit 2 units.

The topics in this course include the administration and organization of occupational medical departments, physical examinations, rehabilitation, counselling, and medico-legal problems. Guest lecturers present problems associated with specific industries. The course is not offered if less than four students enroll.

Environmental Health 10c,d. Community Air Pollution

Lectures, demonstrations, and seminars. *One two-hour session each week, third and fourth periods.* Dr. FIRST and Staff of the Center.

Credit 2 units.

This lecture and seminar course is designed for engineers, chemists, and physicians interested in air pollution control. Topics presented include the measurement and control of community air pollution; air quality standards; health effects of air pollution; damage to animals, plants and property; community and site surveys; the legal and enforcement aspects of air pollution control; and the nature and quantity of atmospheric emissions from transportation vehicles, municipal incinerators and specific industries.

Environmental Health 11c,d. Operations Research in Environmental Health Engineering

Lectures and computer exercises. *Three hours each week, third and fourth periods.* Dr. HARRINGTON.

Credit 3 units.

This course is an introduction to the concepts and techniques of operations research, applied to problems of environmental health sciences and engineering. Topics include the following: several interrelated mathematical techniques of optimization — Lagrangian methods, steepest descent, linear, nonlinear and dynamic programming, approximation theory; systems analysis of air and water treatment and solid waste disposal practices; applications of queueing theory, Markov processes, and statistical decision theory.

Prerequisite: Mathematics 20b, or its equivalent, is desirable.

Enrollment is subject to the approval of the Instructor.

SCHOOL OF PUBLIC HEALTH

Environmental Health 12c,d. Meteorology and Transport of Air Pollutants

Lectures and demonstrations. *One two-hour session each week, third and fourth periods.* Dr. MAHONEY.

Credit 2 units.

This course presents an evaluation of the meteorological factors associated with the transport of air pollutants. Topics include the properties of the atmosphere near the ground, turbulent dispersion of pollutants, instrumentation for evaluating the movement and behavior of air pollutants, atmospheric diffusion equations, diffusion from single and area sources, and mathematical models for evaluating urban air pollution. Applications of meteorological theory to air pollution phenomena are emphasized through demonstrations and the assignment of specific problems.

Admission is subject to the approval of the Instructor.

Environmental Health 30e. Field Work

Credit 1 unit.

A week of supervised field observation is offered from January 29 to February 3, 1968. Students may choose appropriate visits to medical or industrial hygiene departments of industries, airports, and other agencies which have operations or research in the field of environmental health.

Planning 6-2b. Urban Environmental Service Systems (Arch. Sci. 290)

This course, which is presented in the Graduate School of Design, is open to properly qualified students in the School of Public Health.

Seminar. Half course (spring term). Hours to be arranged. Assistant Professors HARRINGTON and COLE.

This course undertakes investigations into problems of planning for environmental services within urban regions. A systems analysis approach, incorporating computer methods, is followed whenever practicable. The interrelated problems of land use, urban form and function, and the provision of environmental services are emphasized. Topics include urban-planning aspects of solid and liquid waste collection and disposal, public water supply and distribution, environmental pollution, and electric power generation and distribution. Governmental mechanisms for planning environmental systems investment and regulation are explored, together with conservation and quality-control legislation.

The following courses in the Law School are open to properly qualified students in the School of Public Health. Enrollment is subject to the approval of the Instructor.

HARVARD UNIVERSITY

Seminar: Legal Protection against Hazardous Products

Fall term. Two hours a week. Professor CAVERS.

This seminar examines problems for government, industry, and science caused by product hazards resulting from recent scientific and technological developments. Consideration is given to the control of such products as dangerous and ineffective drugs, chemical food and color additives, and radioactive isotopes, and to the roles of the legislative, judicial, and administrative processes in affording protection. Experts are invited on occasion to discuss problems in their respective fields.

Seminar: Legal Protection of Environmental Quality

Spring term. Two hours a week. Professor CAVERS.

This seminar examines problems for government, industry, and science resulting from the impairment of the quality of the environment, especially by technological developments and urban growth. Consideration is given to the control of water and air pollution, to the regulation of nuclear power reactors, and to the roles of federal, interstate, state, and local agencies in affording protection. Experts are invited on occasion to discuss problems in their respective fields.

Department of Industrial Hygiene

JAMES L. WHITTENBERGER, S.B., M.D., A.M. (hon.), James Stevens Simmons Professor of Public Health, Professor of Physiology and Acting Head of the Department

*MELVIN W. FIRST, S.B., S.M., S.D., Associate Professor of Applied Industrial Hygiene

*GEORGE F. WILKINS, A.B., M.D., Associate Clinical Professor of Occupational Medicine; *Medical Director, New England Telephone Company*

DADE W. MOELLER, S.B., S.M., PH.D., Lecturer on Radiological Health and Associate Director, Kresge Center for Environmental Health

WILLIAM A. BURGESS, S.B. IN MECH.ENG., S.M., Assistant Professor of Environmental Health and Safety Engineering; *Consultant on Environmental Health and Safety, University Health Services*

*RICHARD DENNIS, S.B., S.M., Assistant Professor of Applied Industrial Hygiene; *Aerosol Physics Department, G.C.A. Corporation, Bedford*

JAMES R. MAHONEY, S.B., PH.D., Assistant Professor of Applied Meteorology

PARKER REIST, S.B., S.M., S.M. IN HYG., S.D. IN HYG., Assistant Professor of Environmental Health Engineering

†JACOB SHAPIRO, S.B., S.M., PH.D., Assistant Professor of Biophysics in Environmental Hygiene; *Radiological Health and Safety Engineer, University Health Services*

FREDERICK J. VILES, JR., S.B., S.M., Research Associate and Lecturer on Industrial Hygiene

*JAMES M. AUSTIN, B.A., M.A., S.D., Visiting Lecturer on Meteorology and Air Pollution; *Associate Professor of Meteorology, Massachusetts Institute of Technology*

*ALLEN D. BRANDT, S.B., S.M., S.D., Visiting Lecturer on Industrial Hygiene Engineering; *Manager of Industrial Health Engineering, Bethlehem Steel Corporation*

*LAWRENCE S. COOKE, Visiting Lecturer on Illumination; *District Engineer, General Electric Company*

*JOHN K. DANE, A.B., LL.B., LL.M., Visiting Lecturer on Workmen's Compensation; *Counsel, Liberty Mutual Insurance Companies*

*HORACE W. GERARDE, S.B., S.M., M.D., PH.D., Visiting Lecturer on Industrial Toxicology; *Medical Director, Becton, Dickinson and Company*

* Part-time in the School of Public Health.

† Part-time in the School of Public Health, full-time in Harvard University.

HARVARD UNIVERSITY

*NATHAN VAN HENDRICKS, B.E., CHEM.E., Visiting Lecturer on Industrial Hygiene Engineering; *Assistant Director for Environmental Sciences, Standard Oil Company (New Jersey)*

*JOHN H. LUDWIG, S.B., S.M., S.M. IN HYG., S.D. IN HYG., Visiting Lecturer on Community Air Pollution; *Associate Director, National Center for Air Pollution Control, Public Health Service*

CANDACE A. OVIATT, S.B., PH.D., Research Associate in Marine Biology

*JANET W. CARES, S.B., S.M. IN HYG., Assistant in Industrial Hygiene

HARRIET L. HARDY, A.B., M.D., *Lecturer on Medicine, Harvard Medical School; Assistant Medical Director in charge of Occupational Medical Service, Massachusetts Institute of Technology*

ALBERT O. SEELER, A.B., M.D., *Lecturer on Medicine, Harvard Medical School; Professor and Medical Director, Massachusetts Institute of Technology*

One of the major objectives of this Department is to provide graduate instruction and research in the prevention and control of occupational diseases. This was the primary objective when the Department was created almost fifty years ago, and it still is. Other objectives are to provide instruction and research opportunities in the fields of air pollution control and radiological health.

Courses offered by the Department are open to physicians, engineers, and other students with adequate background in physics, chemistry, and biology. The course, Industrial Hygiene 3c,d covers the basic problems of industrial hygiene and industrial environments. It is the principal elective course for Master of Public Health candidates. It is also a basic course for students concentrating in the Master of Industrial Health or Master of Science in Hygiene program. Additional emphasis on industrial toxicology and environmental physiology is provided by the Department of Physiology.

Some of the courses in this Department carry "Engineering" numbers and provide course credit through the Division of Engineering and Applied Physics in Cambridge.

Industrial Hygiene 3c,d. Basic Problems in Occupational Health and Industrial Environments (Engineering 282)

Lectures, laboratory demonstrations and field trips. *Two two-hour sessions and one three-hour session each week, third and fourth periods. Dr. FERRIS, Dr. FIRST and Staff of the Kresge Center.*

Credit 6 units.

A course of lectures, laboratory demonstrations and inspections of work places showing the relation of working conditions to health with special reference to control of industrial hazards. Examples include adverse condi-

tions of temperature, humidity, radiation, and chemical and physical irritants. Particular emphasis is given to the prevention, diagnosis, and treatment of industrial disability and disease, and to workmen's compensation.

Industrial Hygiene 4a,b. Analysis of Air Contaminants (Engineering 281)

Lectures and laboratory. *One two-hour session and one three-hour session each week, first and second periods.* Mr. VILES and Staff of the Department.

Credit 4 units.

This course emphasizes methods used in identifying and quantifying gases, vapors, dusts, fumes, and mists in the atmosphere. It includes a review of the fundamentals with specific coverage of the following topics: the chemical and physical nature of air contaminants, the establishment of standards, the principles of sampling, and techniques for analysis such as iodimetry, spectrophotometry, emission spectroscopy, gas chromatography, optical microscopy, and electrometric methods. The student is also provided instruction in the theory and use of direct reading field instruments.

This course is intended for public health engineers. Master of Industrial Health candidates are urged to enroll in this course.

Industrial Hygiene 5a,b. Environmental Control (Engineering 280)

Lectures and laboratory. *Two one-hour sessions and one three-hour session each week, first and second periods.* Assistant Professor BURGESS and Dr. FIRST.

Credit 4 units.

This course deals with selected topics in environmental control for engineers and physical science majors, including thermal environmental engineering, indices of heat stress, industrial ventilation, hood and duct design, performance of air movers and air cleaning devices, air conditioning, and specially controlled environments such as clean rooms, hospital operating rooms, and experimental animal quarters.

Industrial Hygiene 6c,d. Aerosol Technology (Engineering 286)

Lectures and laboratory. *Two one-hour sessions and one three-hour session each week, third and fourth periods.* Dr. REIST.

Credit 4 units.

This course includes a review and discussion of the properties of dust clouds and the physical principles underlying their behavior. Topics covered include diffusion, droplet condensation and evaporation, light scattering and the motion, trajectories, and electrical properties of particles. The program represents an advanced course of study and is specifically designed for students interested in air pollution evaluation and control.

Prerequisite: Industrial Hygiene 4a,b.

HARVARD UNIVERSITY

Industrial Hygiene 7c,d. Radiation Protection Engineering (Engineering 287)

Lectures. *Four one-hour sessions each week, third and fourth periods.*
Dr. SHAPIRO.

Credit 4 units.

This course deals with the basic theory and calculations utilized in radiation control and nuclear safety. Specific topics include introduction to reactor physics, safeguards for preventing criticality and reactor accidents, radiation shielding, radiation damage, and analysis of environmental reactor hazards.

Prerequisites: Physics 101, Physics 112b or Environmental Health 4a,b.

Industrial Hygiene 8c,d. Advanced Air Analysis (Engineering 283)

Lectures and laboratory. *Two one-hour sessions and one three-hour session each week, third and fourth periods.* Mr. VILES and Staff of the Department.

Credit 4 units.

A continuation of Industrial Hygiene 4a,b, Analysis of Air Contaminants. Consideration is given in this course to advanced chemical and instrumental methods for the analysis of environmental pollutants. Techniques and procedures covered include isokinetic sampling, duct and stack analysis, dust identification, air pollution analysis, and the determination of radioactive and flammable contaminants as well as micro-organisms.

Course 8c,d is intended for air analysts, engineers and properly qualified physicians.

Prerequisite: Industrial Hygiene 4a,b.

Industrial Hygiene 17a,b,c,d,e.

Tutorial Program (Reading or Research). *Time and credit to be arranged.*

Reading or research assignments for individual tutorial work at a Master's degree level are provided for qualified students in the fields of industrial hygiene, industrial ventilation, aerosol technology, radiological hygiene and air pollution control.

Enrollment is subject to the approval of the Head of the Department.

During 1967-68 a seminar on current problems in health physics and radiation physics will be offered in the third and fourth periods under Industrial Hygiene 17c,d.

Industrial Hygiene 20. Research

Properly qualified students at the post-master's level or those who have been accepted as doctoral candidates are given an opportunity to pursue independent research work on problems of industrial hygiene, including industrial ventilation, aerosol technology, air pollution control and radiological hygiene.

Enrollment is subject to the approval of the Head of the Department.

Department of Physiology

JAMES L. WHITTENBERGER, S.B., M.D., A.M., (hon.), James Stevens Simmons Professor of Public Health, Professor of Physiology and Head of the Department

Ross A. McFARLAND, A.B., PH.D., S.D., (hon.), Daniel and Florence Guggenheim Professor of Aerospace Health and Safety

JERE MEAD, S.B., M.D., Professor of Physiology

MARY O. AMDUR, S.B., PH.D., Associate Professor of Toxicology

†BENJAMIN G. FERRIS, JR., A.B., M.D., Associate Professor of Environmental Health and Safety; *Director of Environmental Health and Safety, University Health Services*

SHELDON D. MURPHY, S.B., PH.D., Associate Professor of Toxicology

HARRY HEIMANN, S.B., M.D., Senior Research Associate in Environmental Health and Lecturer on Occupational Medicine

WILLIAM L. CLAFF, A.B., M.B.A., Lecturer on Administration and Assistant Dean for Financial Affairs

*WILLIAM H. FORBES, A.B., A.M., DR.PHIL., M.D., Lecturer on Physiology

DAVID E. LEITH, A.B., M.D., Assistant Professor of Physiology

JOHN B. LITTLE, A.B., M.D., Assistant Professor of Radiobiology

JOHN M. PETERS, S.B., M.D., M.P.H., S.D. IN HYG., Assistant Professor of Occupational Medicine

RONALD M. PICKETT, A.B., A.M., PH.D., Assistant Professor of Experimental Psychophysiology

HOWARD W. STOUTD, JR., A.B., A.M., PH.D., S.M. IN HYG., Assistant Professor of Physical Anthropology

*CHARLES A. BERRY, A.B., M.D., M.P.H., Visiting Lecturer on Aerospace Medicine; *Director of Medical Research and Operations, NASA Manned Spacecraft Center*

*HERVEY B. ELKINS, A.B., PH.D., Lecturer on Industrial Toxicology; *Director, Massachusetts Division of Occupational Hygiene*

*DAVID W. FASSETT, A.B., M.D., Visiting Lecturer on Occupational Medicine; *Director, Laboratory of Industrial Medicine, Eastman Kodak Company*

EDWARD J. BURGER, B.S.C., M.D.C.M., M.I.H., S.D. IN HYG., Research Associate in Physiology

ROLAND C. MOORE, A.B., A.M., PH.D., Research Associate in Occupational Safety

† Part-time in the School of Public Health, full-time in Harvard University.

* Part-time in the School of Public Health.

HARVARD UNIVERSITY

JOSEPH D. BRAIN, A.B., S.M., S.M. IN HYG., S.D. IN HYG., Research Associate in Physiology

THOMAS J. CROWLEY, S.B., S.M., Research Associate in Environmental Health and Safety

DWIGHT W. UNDERHILL, B.E., S.M. IN HYG., S.D. IN HYG., Research Associate in Physiology

LUISA C. WEISSENBORN, M.D., Research Associate in Physiology

*JOHN M. TYLER, A.B., M.D., Research Associate in Physiology; *Senior Physician and Director of the Pulmonary Laboratory, Lemuel Shattuck Hospital*

IAN D. GREEN, M.B., B.S., M.R.C.P., Senior Research Fellow in Physiology

KEVIN E. FINUCANE, M.B., B.S., M.R.A.C.P., Research Fellow in Physiology

FREDERIC G. HOPPIN, JR., A.B., M.D., Research Fellow in Physiology

RONALD J. KNUDSON, S.B., M.D., Research Fellow in Physiology

GAVRIEL LEWINSHON, M.D., Research Fellow in Physiology

KAROL S. WISNIESKI, S.B., M.P.H., Research Fellow in Epidemiology and Environmental Health

MANUEL WORCEL, M.D., Research Fellow in Physiology

ROBERT G. MONROE, A.B., M.D., *Associate in Pediatrics at the Children's Hospital*

MARY ELLEN BECK WOHL, M.D., *Instructor in Pediatrics at the Children's Hospital*

The Department of Physiology is a medical science department with interests that extend into several aspects of public health, particularly environmental health. Personnel in the Department include physicians, physiologists, psychologists, physical anthropologists, health and safety specialists, toxicologists, and specialists in radiobiology, occupational medicine and aerospace health and safety. Students and Research Fellows come with similarly varied backgrounds, and the research activities of the Department reflect this broad range of interests.

A fundamental aim of the Department is to provide basic information on the relationship of man to his physical and chemical environment. An introduction to these concepts is presented in the required course Environmental Health 1a,b. These concepts are examined in detail in specialized courses such as Environmental Physiology, Principles of Toxicology, Radiation Biology, and Human Factors in Occupational Performance and Safety. Specific research projects of members of the Department offer the qualified student an opportunity to gain experience in, and to develop a capacity for, critical evaluation of research methods and analysis.

SCHOOL OF PUBLIC HEALTH

The research programs include topics such as respiratory physiology, effects of ionizing radiation, human factors in transportation safety, effects of environmental chemicals on man and animals, causation of chronic non-specific respiratory disease, exercise and work physiology, and factors involved in fitting the machine and work environment to the capabilities of human performance.

International interests of the Department involve attempts to determine the causation of chronic nonspecific respiratory diseases by comparing results obtained by similar methods in various countries.

Physiology 3a,b. Human Physiology

Lectures and demonstrations. *One two-hour session and one one-hour session each week, first and second periods.* Dr. MEAD and Staff of the Department.

Credit 3 units.

This course is intended for students who lack a background in physiology. The time is divided approximately equally among cellular physiology, organ and organ system physiology, and function of the total organism. The purpose of the laboratory exercises is to give the students some experience with problems of observing living systems.

Prerequisites: College courses in physics, chemistry and mathematics.

Physiology 4c. Environmental Physiology

Lectures and conferences. *One two-hour session each week, third period.* Dr. LEITH and Staff of the Department.

Credit 1 unit.

This course is intended for students specializing in occupational health and takes up in greater detail some of the subjects considered in Environmental Health 1a,b.

This course includes a discussion of natural and artificial environments, human tolerance to high and low temperature, physical fitness and its measurement, the effects of age and fatigue, and the efficiency of various types of muscular work.

Prerequisite: Master of Science in Hygiene candidates who wish to take this course must have had Physiology 3a,b or the equivalent.

Physiology 5c,d. Principles of Toxicology

Lectures and laboratory work. *Two two-hour sessions each week, third period; one one-hour session and one two-hour session each week, fourth period.* Dr. AMDUR and Dr. MURPHY.

Credit 4 units.

HARVARD UNIVERSITY

A short written report is required in this course.

This course presents an introduction to the effects of toxic chemical agents on living organisms with particular reference to experimental techniques of assessing toxicity. Several classes of toxic agents are studied with respect to mechanisms of action on living tissue, functional changes resulting from exposure, and methods of evaluating the damage produced.

Prerequisite: Physiology 3a,b or equivalent.

Physiology 6d. Special Topics in Respiratory Physiology

Lectures. *One two-hour session each week, fourth period.* Dr. MEAD and Staff of the Department.

Credit 1 unit.

This course covers special topics in respiratory physiology, according to the interest of the students. It is intended primarily for students in the aviation medicine program. Other students who are specializing in environmental health may enroll with the consent of the Instructor.

Physiology 7c,d. Radiation Biology

Lectures and laboratory work. *Lectures, two one-hour sessions each week. Laboratory, one three-hour session each week, third and fourth periods.* Dr. LITTLE.

Credit 5 units.

Two additional hours each week of individual laboratory work and written reports are required in this course.

This course deals with the biological effects of ionizing radiation and is divided into two parts, cellular and mammalian radiation biology. Included in the first will be a discussion of elementary target theory, radiation chemistry, effects on macromolecules, cellular and chromosomal effects, and recovery processes. The second part covers the acute and long-term effects of radiation with emphasis on man, as well as a discussion of environmental sources of radiation and the characteristics of internal and external human exposure.

Prerequisite: Physiology 3a,b, or equivalent.

Physiology 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

Opportunities are provided for tutorial work at a master's degree level in the fields of respiratory physiology, toxicology, and occupational medicine.

Physiology 20. Research

Doctoral candidates and other properly qualified students may undertake laboratory or field research by arrangement with the Head of the Department.

Department of Sanitary Engineering

HAROLD A. THOMAS, JR., S.B., S.M., S.D., Gordon McKay Professor of Civil and Sanitary Engineering

J. CARRELL MORRIS, S.B., A.M., PH.D., A.M. (hon.), Gordon McKay Professor of Sanitary Chemistry

JOSEPH J. HARRINGTON, B.C.E., A.M., PH.D., Assistant Professor of Environmental Health Engineering

The following members of the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences participate in teaching in the School of Public Health:

WERNER STUMM, DR.PHIL., A.M. (hon.), Gordon McKay Professor of Applied Chemistry (Absent 1967-68)

MYRON B. FIERING, A.B., S.M., PH.D., Associate Professor of Engineering and Applied Mathematics

JAN W. M. LA RIVIÈRE, CHEM.E., PH.D., Visiting Professor of Environmental Biology

RALPH MITCHELL, B.A., PH.D., Assistant Professor of Applied Biology

ROBERT P. BURDEN, S.B., S.M., S.D., Administrative Associate in the Water Quality Program

The Courses in which members of this Department participate in the School of Public Health are listed under the Environmental Health courses on pages 77-78 and 80 (Environmental Health 1a,b and 11c,d).

The following courses of instruction offered in the Division of Engineering and Applied Physics of the Graduate School of Arts and Sciences are open to properly qualified students:

Engineering 250a. Design of Water Resource Systems. Professor THOMAS.

Engineering 250b. Design of Water Resource Systems. Professor THOMAS.

Engineering 253. Advanced Topics in Environmental Engineering. Associate Professor FIERING.

Engineering 270a. Water Supply Engineering. Dr. ____.

Engineering 270b. Operations in Water and Waste Treatment. Dr. ____.

Engineering 271a. Principles of Aqueous Chemistry. Professor MORRIS.

Engineering 271b. Chemical and Biological Processes in Sanitary Engineering. Dr. ____.

HARVARD UNIVERSITY

Engineering 272a. Water Quality and Its Control. Professor LA RIVIÈRE.
Engineering 272b. Hydrogeochemical Cycles. Professor STUMM.

(To be omitted in 1967-68.)

Engineering 273ar. Introduction to Environmental Biology. Assistant Professor MITCHELL.

Engineering 273br. Special Topics in Environmental Microbiology. Professor LA RIVIÈRE.

Engineering 276. Advanced Chemical Measurements. Professor MORRIS.

Engineering 277. Surface Chemistry. Professor MORRIS.

(To be omitted in 1967-68.)

Engineering 278. Rate Processes. Professor MORRIS.

(To be omitted in 1968-69.)

Engineering 279. Applied Electrochemistry. Professor STUMM.

(To be omitted in 1967-68.)

Center for the Prevention of Infectious Diseases

Thomas H. Weller, A.B., S.M., M.D., LL.D., Director

The Center for the Prevention of Infectious Diseases is comprised of the Departments of Microbiology and of Tropical Public Health. Working in close collaboration, the staffs of the two Departments are concerned with the broad spectrum of agents, i.e., viral, rickettsial, bacterial, mycotic, protozoal, and helminthic entities, that parasitize man, and with their relevant arthropod and molluscan vectors.

On a global basis the infectious diseases remain a primary cause of mortality. In the developed areas of the world, morbidity attributable to infectious diseases persists as a major impediment to the enjoyment of complete health. An increasing number of chronic degenerative diseases are recognized as stemming from the insults of prior infectious processes. In many societies, acceptance of the concept of population control awaits containment of undue mortality induced by the infectious diseases, and the consequent assurance that children who are born will have a reasonable prospect of achieving maturity. Considerations such as the foregoing emphasize the continuing need for the public health expert to possess knowledge of the rapidly changing technology of the control of infectious diseases, as well as a basic knowledge concerning the attributes and epidemiologic characteristics of the responsible agents.

The Faculty of the Center for the Prevention of Infectious Diseases operate in close collaboration to discharge a common responsibility for multi-disciplinary instruction in the various facets of diseases of infectious etiology. The formal course offerings of the two Departments are designed and scheduled to permit the acquisition of a broad basic knowledge of infectious diseases as well as an introduction to specialized subject areas. For advanced qualified students, concentration in specific areas with participation in collaborative or individual research is encouraged both at the pre-doctoral and the post-doctoral levels. The wide variety of current research projects in the Center permits acquisition of experience both at home and abroad in the laboratory or in the field. Training grant funds are available for the support of qualified individuals specifically interested in public health bacteriology, rickettsiology, virology, mycology, parasitology, and tropical medicine.

Department of Microbiology

JOHN C. SNYDER, A.B., M.D., LL.D., Henry Pickering Walcott Professor of Public Health and Head of the Department

EDWARD S. MURRAY, A.B., M.D., M.P.H., Professor of Microbiology

*GEOFFERY EDSELL, M.D., Professor of Applied Microbiology; *Superintendent, Institute of Laboratories, Massachusetts Department of Public Health*

SAMUEL D. BELL, JR., A.B., M.D., M.P.H., Associate Professor of Microbiology

CHARLOTTE C. CAMPBELL, S.B., Associate Professor of Medical Mycology

ROBERT S. CHANG, B.Sc., M.D., S.D. IN HYG., Associate Professor of Microbiology

HERBERT L. LEY, JR., M.D., M.P.H., Associate Professor of Epidemiology and Microbiology (Absent 1967-68)

J. WILLIAM VINSON, S.B., S.D. IN HYG., Senior Research Associate and Lecturer on Microbiology

*ROBERT A. MACCREADY, S.B., M.D., Lecturer on Applied Microbiology; *Director, Division of Diagnostic Laboratories, Massachusetts Department of Public Health*

*ROGER L. NICHOLS, A.B., M.D., Assistant Professor of Applied Microbiology; *Associate Director, Aramco Trachoma Program for Saudi Arabia, and Chief of Medical Research, Medical Department, Arabian American Oil Company* (Absent 1967-68)

JOHN H. PETERS, S.B., M.D., Assistant Professor of Microbiology

*HERALD R. COX, A.B., S.D., S.D. (hon.), Visiting Lecturer on Microbiology; *Director of Virus Research, Lederle Laboratories Division, American Cyanamid Company*

*HORACE M. GEZON, A.B., M.D., Visiting Lecturer on Microbiology; *Chairman, Department of Pediatrics, Boston University School of Medicine and Director of Pediatrics, Boston City Hospital*

*MORTON A. MADOFF, A.B., M.D., Lecturer on Microbiology; *Director, Division of Biologic Laboratories, Massachusetts Department of Public Health*

*ROBERT B. PENNELL, S.B., S.M., PH.D., Lecturer on Immunology; *Director of Laboratories, The Protein Foundation, Inc.*

*CHARLES H. RAMMELKAMP, A.B., M.D., S.D. (hon.), Visiting Lecturer on Microbiology; *Professor of Medicine, Western Reserve University School of Medicine*

MANUEL ROCA-GARCIA, M.D., M.P.H., Research Associate in Microbiology

* Part-time in the School of Public Health.

SCHOOL OF PUBLIC HEALTH

*MARTHA D. BERLINER, A.B., S.M., PH.D., Research Associate in Microbiology; *Instructor in Biology, Simmons College*

*CHARLES E. O. FRASER, B.V.SC., M.R.C.V.C., D.T.V.M., S.M., Research Associate in Microbiology; *Microbiologist, New England Regional Primate Research Center*

*KENNETH F. GIRARD, S.B., M.SC., PH.D., Research Associate in Microbiology; *Assistant Director, Division of Diagnostic Laboratories, Massachusetts Department of Public Health*

*VICTOR LORIAN, M.D., Research Associate in Microbiology; *Director, Clinical and Research Laboratories, Sanatorium Division, Boston City Hospital and Assistant Clinical Professor, Boston University School of Medicine*

MARIE EBE RECA, DR.CHEM., Research Associate in Medical Mycology

*GRACE C. YUAN, B.SC., M.D., Research Associate in Microbiology

KAARE J. LINDQVIST, V.M.D., M.SC., PH.D., Research Fellow in Applied Immunology

*LEO LEVINE, S.B., Assistant in Microbiology; *Chief of Laboratory, Biologic Laboratories, Massachusetts Department of Public Health*

DOROTHY E. McCOMB, S.B., Assistant in Microbiology

JANE D. O'CONNOR, S.B., Assistant in Microbiology

*JUDITH M. SPIELMAN, S.B., S.M. IN HYG., Assistant in Microbiology

LOUIS WEINSTEIN, S.B., S.M., PH.D., M.D., *Lecturer on Infectious Diseases, Harvard Medical School; Professor of Medicine, Tufts University School of Medicine*

RUTH B. KUNDSIN, A.B., A.M., S.D. IN HYG., *Research Associate in Bacteriology, Department of Surgery, Harvard Medical School; Associate Staff Member, Peter Bent Brigham Hospital*

The Department of Microbiology is concerned with infectious diseases caused by bacteria, fungi, viruses, rickettsiae, and bedsoniae. In addition to prevention and control of such infections, the interests of the Department include the general ecology of the causative microorganisms, the natural history of the diseases in question, and their mechanisms of transmission.

The Department shares the responsibility for teaching and research on infectious diseases with the Department of Tropical Public Health. A major objective of both Departments is to interrelate the laboratory with epidemiologic and ecologic aspects of the principal infectious disease problems in both the advanced and the developing regions of the world. In general, the courses of instruction presented by the Department require a background in the medical and/or biological sciences.

HARVARD UNIVERSITY

The basic course, Microbiology-Tropical Public Health 1a,b, is designed to provide students in the Master of Public Health program with the principles of microbiology and parasitology, as well as the most recent advances in factual information essential to a general understanding and comprehensive approach to resolving infectious disease problems in the field of public health.

The advanced courses of the Department are offered for students who wish to acquire a better understanding of the broad range of problems in infectious diseases of public health importance. The advanced courses also serve as an introduction for the individual who proposes to specialize in microbiology and to undertake original investigation in this field of knowledge. In this context, students may register for Microbiology 17 or 20 after they have acquired or have demonstrated technical skill essential for safety in dealing with highly infectious microorganisms. These two courses provide the opportunity for working in close association with a member of the Staff. The choice of problems for individual work is illustrated under Microbiology 17 and 20. As noted therein, the present Departmental research activities encompass a wide range of interests, including not only basic studies on viral, rickettsial, bacterial and mycotic agents, *per se*, but also biological aspects of host-parasite relationships, ecologic and environmental factors, properties of human cells in tissue culture, immunologic problems and statistical and field assay techniques.

The Institute of Laboratories of the Massachusetts Department of Public

Dr. Edward S. Murray (right) and Dr. Robert S. Chang (left)



Health has a close affiliation with the School of Public Health. The senior staff members of the Institute hold appointments in the Department. The changing responsibilities, problems and developments of the present-day public health laboratory are thus brought actively into the teaching program of the Department.

Training programs supported by the National Institutes of Health are available to assist qualified applicants who desire training in infectious diseases.

In addition to satisfying the general requirements of the School, candidates for the Master of Public Health degree who elect to concentrate in Microbiology are expected to complete Microbiology and Tropical Public Health 2b, Microbiology 4c, and at least three of the following, Microbiology 11d, 12d, 13d and 15d.

Microbiology and Tropical Public Health 1a,b. Ecology and Epidemiology of Infectious Diseases

Lectures, seminars, and laboratory exercises. *Three one-hour sessions each week, first and second periods; one three-hour session each week, first period, and one two-hour session each week, second period.* Dr. WELLER, Dr. MURRAY, Associate Professor CAMPBELL, and Staff of the two Departments.

Credit 4 units.

Required of all candidates for the degree of Master of Public Health.

This course is designed to provide an integrated presentation of information on communicable diseases of major public health importance. The exercises include discussions of the present status of infectious diseases in temperate and tropical climates, of procedures for their control at the community level, and of techniques available for study of microorganisms and parasites with special reference to recently developed methods which have opened a new era in microbiology. Coverage of etiologic agents includes the protozoa, helminths, viruses, rickettsiae, spirochetes, fungi, and bacteria. To achieve a comprehensive approach, subjects of public health importance and of diverse etiologies, such as the acute respiratory diseases, are considered in an integrated manner. Other important entities, such as malaria and schistosomiasis, are selected for emphasis as case examples to illustrate epidemiological concepts and the elements of control.

The course assumes a medical school background and an understanding of the pathogenesis of disease produced by infectious agents in the affected individual. It is concerned primarily with the ecologic factors affecting transmission of infectious agents in the human community, with assessment of public health significance of representative infectious diseases, and with approaches to their prevention and control. In the laboratory, the student is not expected to acquire technological skills, but rather an understanding of

HARVARD UNIVERSITY

the potentialities as well as of the limitations of pertinent public health laboratory procedures.

Microbiology and Tropical Public Health 2b. Current Research in Infectious Diseases

Seminars. *One two-hour session each week, second period.* Staff of the Department of Microbiology and Tropical Public Health.

Credit 1 unit.

This course is required for students who are concentrating in microbiology or tropical public health. Important papers from current periodicals on topics of general interest are assigned to the students for presentation. These papers are reviewed critically for evaluation of the experimental work, analysis of the results, organization of the manuscripts, and clarity of presentation.

The purpose of the course is to develop the ability of the students to read the literature analytically and to plan their own work and manuscripts effectively.

Microbiology 3c. Clinical Problems in Infectious Diseases

Lectures and clinics. Given at the New England Center Hospital. *One two-hour session each week, third period.* Dr. WEINSTEIN.

Credit 1 unit.

Problems of diagnosis, treatment and control of the common acute communicable diseases of temperate climates, as well as discussions of infectious diseases that are usually not considered communicable.

Microbiology 4c. Public Health and Laboratory Aspects of Infectious Diseases of Microbial Origin

Seminars and laboratory exercises. *Two three-hour sessions and one one-hour session each week, third period.* Dr. MURRAY, Dr. BELL, Dr. CHANG, Dr. MACCREADY, Dr. GIRARD, Dr. PETERS, Dr. VINSON and Associate Professor CAMPBELL.

Credit 2.5 units.

This course is an amplification of Microbiology-Tropical Public Health 1a,b. The exercises are directed to the further study of infectious diseases of bacterial, rickettsial, viral and mycotic origin and to the laboratory procedures by which infections and disease, caused by these agents, are identified, prevented and/or controlled.

Seminars are oriented to the epidemiologist, as well as to the microbiologist. The comprehensive approach is emphasized in resolving outbreaks of infectious diseases. The discussions stress the potentialities and limitations of the various laboratory techniques employed in the conduct of representative types of field investigations.

SCHOOL OF PUBLIC HEALTH

Laboratory exercises carried out by the students include the conventional procedures used in the isolation and identification of bacteria; spirochetes and fungi of greatest importance in public health; tissue culture and egg inoculation techniques for isolation and characterization of viruses and rickettsiae; and miscellaneous methods, such as animal inoculation and serologic and immunologic techniques, as they are variously employed in each of these specialized areas of microbiology.

Limited to fourteen students who are enrolled in Microbiology-Tropical Public Health 1a,b.

Epidemiology and Microbiology 5c. Epidemiologic Problems in Infectious Diseases

Conferences, seminars, laboratory exercises. *Two two-hour sessions each week, third period.* Staffs of the Departments.

Credit 2 units.

A course given by the Staffs of the Departments of Microbiology, Epidemiology and Tropical Public Health providing experience in solving epidemiologic problems in communicable diseases.

Microbiology and Tropical Public Health 6c. Tuberculosis

Seminars. *One two-hour session each week, third period.* Dr. KOCH-WESER and Associate Professor CAMPBELL.

Credit 1 unit.

The purpose of this course is to provide an understanding of the ecology and the public health significance of tuberculosis which continues to be a worldwide problem of major importance. Various features of tuberculosis are discussed particularly the microbiologic, medical, social, and economic aspects.

The significance of differentiating diseases often confused with tuberculosis, especially the respiratory mycoses and "atypical" mycobacterioses, is also considered. These discussions are based on selected, previously assigned literature and experiences of students and Faculty members in developed and developing nations with tuberculosis programs and control.

Visits to local tuberculosis hospital laboratories are arranged upon request.

Microbiology 7a,b. Immunologic Aspects of Microbiology

Lectures, conferences and laboratory sessions. *Two one-hour sessions and two two-hour sessions each week, first and second periods.* Dr. PETERS.

Credit 4 units.

The purpose of this course is to explore the fundamental principles and techniques of immunology through lectures, conferences, appropriate demon-

HARVARD UNIVERSITY

strations and active laboratory participation. The major areas to be covered are: the nature of immunoglobulins, complex nature of cellular and microbial antigens, mechanisms of antibody formation and antibody-antigen interactions, chemical basis of immunological specificity, immunologic tolerance and the host-parasite relationship, hypersensitivity and immunologic mechanisms of tissue damage, genetic aspects of the immune response and the role of immunologic mechanisms in innate immunity and resistance to infection.

Although understanding of basic principles is to be emphasized, special attention is also given to the application and usefulness of immunochemical methods in the study of various microbiological problems.

The course is intended primarily for students in the Master of Science in Hygiene, and Doctor of Science in Hygiene programs and for postdoctoral trainees interested in learning immunologic methods of relevance to their investigations. Other interested students may take the course with the approval of the Instructor. In selected cases, the lecture series may be taken without the laboratory.

Enrollment is subject to the approval of the Instructor.

Epidemiology and Microbiology 8a.,b. Human Genetics

Lectures. Two one-hour sessions each week, first and second periods. Dr. MIETTINEN and Dr. CHANG.

Credit 2 units.

Introductory lectures (12 hours) review current concepts on basic characteristics of genes, regulation of gene action, and the mechanisms of genetic variation. The remainder of the course is devoted to description of methods for investigating genetic problems in man.

Microbiology and Tropical Public Health 11d. Medical Mycology

Laboratory, conferences and field exercises. One three-hour session and three hours of individual laboratory work each week, fourth period. Associate Professor CAMPBELL and Staffs of the Departments.

Credit 2 units.

This course is designed to provide the student with the principles and techniques essential to the study of pathogenic fungi of medical and public health importance. The course consists of conferences, lectures and laboratory, and field work under tutorial supervision. Emphasis is placed on the isolation of mycotic agents from cases in humans and sources in nature by *in vitro* and *in vivo* cultivation, and on identification by morphologic, biochemical and histologic characteristics. Procedures for soil baiting, soil sampling, skin and serologic tests, as adjuncts in establishing indirect or presumptive diagnosis and in defining geographic distribution and areas of high endemicity, are integral aspects of the course.

SCHOOL OF PUBLIC HEALTH

The course is designed to prepare graduates for laboratory research or field studies in the area of medical mycology.

Enrollment is subject to the approval of the Instructor.

Microbiology 12d. The Role of the Laboratory in Public Health Programs and Policies

Seminars. *One two-hour session each week, fourth period.* Dr. EDSELL and Associates at the Massachusetts Institute of Laboratories.

Credit 1 unit.

This course includes an examination of the principles under which immunizing agents are prepared, evaluated, used, and monitored; the uses, abuses, and potential role of diagnostic laboratory services; the role of new services such as PKU testing, rheumatic fever prevention programs, serologic surveillance programs, etc.; other related topics are selected in accordance with the requirements and interests of the class.

Microbiology 13d. Intracellular Microorganisms Pathogenic for Man

Laboratory exercises and seminars. *One three-hour session each week, and three hours of individual laboratory work each week, fourth period.* Dr. MURRAY, Dr. BELL, Dr. CHANG and Staff of the Department.

Credit 2 units.

This course consists of laboratory exercises and seminars which provide an understanding of the techniques available for study of the growth and the characteristics of representative strains of rickettsiae, bedsoniae, or viruses which are important human pathogens. Each student performs the procedures for identification of an unknown pathogen under supervision of the Staff. Seminars emphasize the public health implications of the diseases being studied in the laboratory exercises.

Enrollment is limited to ten students who have completed Microbiology 4c or who have had equivalent preparation previously.

Microbiology 15d. Problems in Medical Bacteriology

Seminars and laboratory demonstrations. *One three-hour session each week, fourth period.* Associate Professor CAMPBELL, Staff of the Department and Visiting Lecturers.

Credit 1 unit.

This course offers an opportunity to review recently developed laboratory procedures pertinent to the isolation and identification of pathogenic bacteria of primary concern to public health. In addition to demonstrations, epidemiologic problems are assessed in seminar discussions. These relate specifically to the role of the laboratory in the diagnosis and control of

HARVARD UNIVERSITY

epidemics due to staphylococci, streptococci, neisseriae, mycobacteriae (including leprae), salmonellae, shigellae, treponemata and other bacterial pathogens of long recognized and emerging importance.

Microbiology 17a,b,c,d. Introduction to Research in Microbiology

Time and credit to be arranged. Staff of the Department.

Students who wish to learn the basic principles and techniques essential to microbiologic research may register for laboratory work to be conducted under the direct supervision of a member of the Departmental Staff.

Course 17 may be elected by candidates for the Master of Public Health or the Master of Science in Hygiene degrees, and may be taken concurrently with the regularly scheduled courses of the Department. Enrollment requires the consent of the staff member who is to be responsible for supervision of the student's work. The various subject areas are listed below by category.

17.1 Pathogenic Fungi, Associate Professor CAMPBELL.

Nutritional requirements; classification on the basis of immunologic properties; serologic procedures for diagnosis of acute respiratory mycoses.

Microorganisms available for study: fungi causing histoplasmosis, coccidioidomycosis, etc.

17.2 Rickettsiae, Dr. MURRAY and Dr. VINSON.

Techniques for propagation of pathogenic rickettsiae; the study of antigenic components; serologic reactions; potency of vaccines.

Microorganisms available are: rickettsiae causing epidemic typhus fever; Brill-Zinsser disease; scrub typhus, Rocky Mountain spotted fever; trench fever.

17.3 Bedsoniae, Dr. BELL, Dr. MURRAY, Dr. NICHOLS and Dr. PETERS.

Trachoma; inclusion conjunctivitis of man; psittacosis; lymphogranuloma venereum; inclusion conjunctivitis of guinea pigs. Laboratory research includes techniques for propagation of bedsoniae; diagnostic procedures including immunofluorescence; antigenic patterns; serologic reactions; and vaccine assays.

17.4 Viruses, Dr. CHANG and Dr. BELL.

Isolation and identification of representative viruses by use of tissue cultures, animal inoculation, serologic techniques.

Viruses used in instruction in research methodology; vaccinia, influenza, adenoviruses, lipovirus.

17.5 Human Cell Culture, Dr. CHANG.

Cultivation of human cells in the laboratory and observation of effects of various external agents on different cell lines.

17.6 Immunochemical Methods, Dr. PETERS.

Experiments with immunofluorescence, immunoelectrophoresis, and other techniques as applied to research on microorganisms and mechanisms of tissue damage.

17.7 Problems in Public Health Laboratory Practice, Dr. EDSALL and Associates at the Massachusetts Institute of Laboratories.

Participation in the research of the Institute of Laboratories, including development and evaluation of knowledge relating to one of the functions of the Institute.

Microbiology 20a,b,c,d. Research in Microbiology

Doctoral candidates, research fellows, or full-time special students who have experience equivalent to that provided by the laboratory courses offered by the Department may register for Microbiology 20 in order to undertake original research in virology, rickettsiology, mycology, bacteriology or immunology. Enrollment requires the concurrence of the Director of the Center for the Prevention of Infectious Diseases, the Head of the Department, and the staff member in charge of the particular area of research elected by the student. Several of the current research activities of the Department of Microbiology are indicated under Course 17 (p. 102). Inquiries as to specific research opportunities should be addressed to the Head of the Department.

Department of Tropical Public Health

THOMAS H. WELLER, A.B., S.M., M.D., LL.D., Richard Pearson Strong Professor of Tropical Public Health, Director of the Center for the Prevention of Infectious Diseases, and Head of the Department

FRANKLIN A. NEVA, S.B., M.D., A.M. (hon.), John LaPorte Given Professor of Tropical Public Health

CHARLOTTE C. CAMPBELL, S.B., Associate Professor of Medical Mycology

ELI CHERNIN, S.B., A.M., S.D., Associate Professor of Tropical Public Health

THOMAS E. FROTHINGHAM, M.D., Associate Professor of Tropical Public Health

DIETER KOCH-WESER, M.D., S.M., PH.D., Associate Professor of Tropical Health and Human Ecology; *Associate Dean for International Programs, Harvard Medical School*

RICHARD H. DAGGY, S.B., S.M., PH.D., M.P.H., DR.P.H., Lecturer on Tropical Public Health and Associate Dean for International Programs

*WARREN L. BERGGREN, M.D., M.P.H., DR.P.H., Assistant Professor of Applied Tropical Public Health; *Director of Community Health, Hôpital Albert Schweitzer, Haiti*

EDWARD H. MICHELSON, S.B., S.M., PH.D., Assistant Professor of Tropical Public Health

STEVE C. PAN, B.S.C., M.D., M.P.H., Assistant Professor of Tropical Public Health

ANDREW SPIELMAN, S.B., S.D., Assistant Professor of Tropical Public Health

*G. ROBERT COATNEY, A.B., A.M., PH.D., S.D. (hon.), Visiting Lecturer on Tropical Public Health; *Professor of Pharmacology, Louisiana State University School of Medicine*

*NEVILLE R. E. FENDALL, B.S.C., M.R.C.S., L.R.C.P., M.B., B.S., M.D., D.P.H., Visiting Lecturer on Tropical Public Health; *Staff Member, The Population Council, Inc.*

*SAMUEL B. KIRKWOOD, A.B., M.D., Visiting Lecturer on International Health; *President, The American University of Beirut*

*HARRY MOST, S.B., M.D., D.T.M. & H., D.M.S., Visiting Lecturer on Tropical Public Health; *Herman N. Biggs Professor and Chairman, Department of Preventive Medicine, New York University School of Medicine*

*DAVID J. SENCER, M.D., M.P.H., Visiting Lecturer on Tropical Public Health; *Chief, National Communicable Disease Control Center*

* Part-time in the School of Public Health.

SCHOOL OF PUBLIC HEALTH

*SAMUEL W. SIMMONS, S.B., A.M., PH.D., Visiting Lecturer on Tropical Public Health; *Director, Pesticides Program, National Communicable Disease Control Center*

*ROBERT B. WATSON, S.B., M.D., M.P.H., Visiting Lecturer on Tropical Health; *Lecturer in International Health, University of North Carolina School of Public Health*

*JOHN M. WEIR, S.B., M.D., PH.D., M.P.H., Visiting Lecturer on Tropical Public Health; *Director, Medical and Natural Sciences, The Rockefeller Foundation*

*CATHERINE C. SEARS, A.B., M.D., M.P.H., Instructor in Tropical Health

EMILE S. DEMIAN, B.S.C., M.S.C., PH.D., Research Fellow in Tropical Public Health

DONALD E. GILBERTSON, S.B., S.M., PH.D., Research Fellow in Tropical Public Health

RONALD GOLD, A.B., M.D., M.P.H., Research Fellow in Tropical Public Health

WILFRED G. ILTIS, A.B., PH.D., Research Fellow in Tropical Public Health

KENJIRO KAWASHIMA, B.S.C., M.S.C., M.D., Research Fellow in Tropical Public Health

VALERIE SKAFF, A.B., Assistant in Tropical Public Health

GUSTAVE J. DAMMIN, A.B., M.D., A.M. (hon.), *Elsie T. Friedman Professor of Pathology, Harvard Medical School*

FRANZ C. VON LICHTENBERG, M.D., DR. (hon.), *Assistant Professor of Pathology at the Peter Bent Brigham Hospital*

The health problems of the tropical regions, as in poorly sanitated areas of the world elsewhere, are predominantly of an infectious and nutritional nature. The infectious diseases are the primary concern of the Department of Tropical Public Health, with particular emphasis given to protozoal, helminthic, and viral entities and to relevant arthropod and molluscan intermediate hosts. Within the framework of the Center for Prevention of Infectious Diseases, the Department of Tropical Public Health shares with the Department of Microbiology the responsibility for an integrated presentation of information on important infectious agents that produce disease in man. Emphasis is given to the ecology and epidemiology of the major infectious diseases and to their prevention and control.

The resolution of the health problems of tropical areas, as elsewhere, requires not only a specific knowledge of diseases but a multidisciplinary approach involving a considered appraisal of human resources as well as of relevant social, economic, and political factors. This elemental concept underlies the teaching program of the Department of Tropical Public Health, and is exemplified in the course Tropical Public Health 3d, Problems in Tropical

HARVARD UNIVERSITY

Health, open to all students. However, the student concentrating in the Department in preparation for a career in the field of international health should, in addition to Departmental courses, acquire a broadened experience by elective work in other areas under the aegis of the Division of International Health.

The basic course, Microbiology and Tropical Public Health 1a,b, is designed to provide students in the Master of Public Health program with newly-elaborated knowledge regarding major infectious diseases, and with the factual information concerning the epidemiology and control of selected entities of public health importance. Students concentrating in the Department are expected to elect Microbiology and Tropical Public Health 2b, Tropical Public Health 3d, and Tropical Public Health 4c. Other advanced courses in Tropical Public Health are considered electives, to be selected on the basis of individual student interest and need.

The investigative program in the Department is broad and currently deals with pathogens ranging from viruses to helminths. Thus, studies on the *in vitro* cultivation and the physiology and immunology of a wide variety of agents are in progress. Biological investigations on the molluscan vectors of the schistosomes comprise another area of major interest. Facilities are available for the training of a limited number of students at the Doctor of Public Health or Doctor of Science in Hygiene level, who may wish to spend a minimum of two years with emphasis on a program of original research. Due to time limitations, the Doctor of Science in Hygiene applicant should, in so far as possible, obtain the necessary medical science background prior to enrollment.

A program supported by the National Institutes of Health is available to assist qualified applicants who desire training in medical parasitology (see page 171) and a similar program is available to provide training in tropical medicine. Collaborative arrangements established with institutions in the tropics provide diversified opportunities for study and research overseas.

Microbiology and Tropical Public Health 1a,b. Ecology and Epidemiology of Infectious Diseases

Lectures, seminars, and laboratory exercises. *Three one-hour sessions each week, first and second periods; one three-hour session each week, first period, and one two-hour session each week, second period.* Dr. WELLER, Dr. MURRAY, Associate Professor CAMPBELL and Staff of the two Departments.

Credit 4 units.

Required of all candidates for the degree of Master of Public Health, this course is designed to provide an integrated presentation of information on communicable diseases of major public health importance. The exercises include discussions of the present status of infectious diseases in temperate and tropical climates, of procedures for their control at the com-

munity level, and of techniques available for study of microorganisms and parasites with special reference to recently developed methods which have opened a new era in microbiology. Coverage of etiologic agents includes the protozoa, helminths, viruses, rickettsiae, spirochetes, fungi, and bacteria. To achieve a comprehensive approach, subjects of public health importance and of diverse etiologies, such as the acute respiratory diseases, are considered in an integrated manner. Other important entities, such as malaria and schistosomiasis, are selected for emphasis as case examples to illustrate epidemiological concepts and the elements of control.

The course assumes a medical school background and an understanding of the pathogenesis of disease produced by infectious agents in the affected individual. It is concerned primarily with the ecologic factors affecting transmission of infectious agents in the human community, with assessment of public health significance of representative infectious diseases, and with approaches to their prevention and control. In the laboratory, the student is not expected to acquire technological skills, but rather an understanding of the potentialities as well as of the limitations of pertinent public health laboratory procedures.

Microbiology and Tropical Public Health 2b. Current Research in Infectious Diseases

Seminars. *One two-hour session each week, second period.* Staff of the Departments of Microbiology and Tropical Public Health.

Credit 1 unit.

This course is required for students who are concentrating in microbiology or tropical public health. Important papers from current periodicals on topics of general interest are assigned to the students for presentation. These papers are reviewed critically for evaluation of the experimental work, analysis of the results, organization of the manuscripts, and clarity of presentation.

The purpose of the course is to develop the ability of the students to read the literature analytically and to plan their own work and manuscripts effectively.

Tropical Public Health 3d. Problems in Tropical Health

Lectures and conferences. *One two-hour session each week, fourth period.* Dr. WELLER and Guest Lecturers.

Credit 1 unit.

This course is designed to provide general background information on environmental, social, economic, and political factors influencing the development of health programs in the tropics. At each session a distinguished guest lecturer covers an assigned topic; the subject material includes such diversified topics as the development of professional education in tropical areas, the

HARVARD UNIVERSITY

important problems of agriculture, nutrition, and water supply, and the administrative and political backgrounds in the field of international technical cooperation. Each formal presentation is followed by a period devoted to informal student discussion. Enrollment is open to all students.

Tropical Public Health 4c. Public Health Aspects of Parasitic Diseases

Lectures, seminars, and laboratory exercises. *Two three-hour sessions each week, third period.* Dr. PAN, Dr. NEVA, Dr. FROTHINGHAM and Staff of the Department.

Credit 2.5 units.

This course amplifies material presented in the basic course, and additionally provides coverage of significant parasitic entities not dealt with in Microbiology-Tropical Public Health 1a,b. Concepts relevant to the investigation and control of parasitic diseases, such as quantitation of infection, are stressed. Selected examples of control programs will be examined. In the laboratory, the student will become familiar with techniques essential for the epidemiologic investigation of the important parasitic diseases of man.

Enrollment is limited and is subject to the approval of the Instructor.

Tropical Public Health 5c. Clinical and Pathologic Features of Tropical Diseases

Case presentations, clinico-pathologic conferences, and demonstrations. *One two-hour session each week, third period.* Dr. NEVA, Dr. von LICHENBERG and Staff of the Department.

Credit 1 unit.

This course, designed for students particularly interested in tropical medicine, supplements material presented in Microbiology-Tropical Public Health 1a,b. The emphasis is on the clinico-pathologic aspects of tropical diseases. At each session one or more disease entities are introduced by presentation of a clinical case and pertinent clinical and pathological features of the disease are then reviewed.

Enrollment is subject to the approval of the Instructor.

Microbiology and Tropical Public Health 6c. Tuberculosis

Seminars. *One two-hour session each week, third period.* Dr. KOCH-WESER and Associate Professor CAMPBELL.

Credit 1 unit.

The purpose of this course is to provide an understanding of the ecology and the public health significance of tuberculosis which continues to be a worldwide problem of major importance. Various features of tuberculosis are discussed, particularly the microbiologic, medical, social, and economic aspects.

The significance of differentiating diseases often confused with tuberculosis, especially the respiratory mycoses and "atypical" mycobacterioses, is also considered. These discussions are based on selected, previously assigned literature and experiences of students and Faculty members in developed and developing nations with tuberculosis programs and control.

Visits to local tuberculosis hospital laboratories are arranged upon request.

Tropical Public Health 7d. Introduction to Molluscs of Public Health Importance

Conferences, laboratory and field exercises. *One three-hour session each week, fourth period.* Dr. MICHELSON.

Credit 1 unit.

To be given in 1968-69; alternates yearly with Tropical Public Health 8d.

This is an introductory course designed to acquaint the student with the molluscs which may act either as active or passive agents for the dispersal of pathogens, toxins, or parasites which cause disease in man. Special emphasis is given to snails which serve as intermediate hosts of mammalian schistosomes. Students are offered the opportunity to study field and laboratory techniques necessary for an understanding of the taxonomy, morphology, cultivation, ecology and control of these medically important molluscs.

Enrollment is subject to the approval of the Instructor.

Tropical Public Health 8d. Epidemiology and Control of Schistosomiasis

Seminars and laboratory exercises. *One three-hour session each week, fourth period.* Dr. MICHELSON, Dr. CHERNIN, Dr. PAN, Dr. WELLER.

Credit 1 unit.

To be given in 1967-68; alternates yearly with Tropical Public Health 7d.

The problems posed by schistosomiasis as an expanding health hazard are presented in a series of seminars and laboratory exercises. Emphasis is given to the biology of snail vectors, to problems of assessment of significance of the disease, and to the potentials of various approaches to control. Opportunity to become familiar with appropriate techniques is afforded in the laboratory.

Enrollment is subject to the approval of the Instructor.

Tropical Public Health 9d. Introduction to Medical Entomology

Conferences, laboratory, and field exercises. *One three-hour session each week, fourth period.* Dr. SPIELMAN.

Credit 1 unit.

To be given in 1967-68; alternates yearly with Tropical Public Health 10d. This course deals with the insects, ticks, and mites of public health im-

HARVARD UNIVERSITY

portance. The manner in which arthropods transmit disease and the principles of vector control are discussed from ecological, physiological and genetic points of view. Each conference presents an aspect of arthropod biology as it pertains to public health. Laboratory colonies of various vector species are maintained by the students to provide the basic material for study of life cycles and for arthropod identification. Laboratory and field exercises demonstrate entomological techniques currently employed by epidemiologists.

Enrollment is subject to the approval of the Instructor.

Tropical Public Health 10d. Current Problems in Malaria

Seminars and laboratory exercises. *One three-hour session each week, fourth period.* Dr. CHERNIN, Dr. SPIELMAN, Dr. WELLER, and Staff of the Department.

Credit 1 unit.

To be given in 1968-69; alternates yearly with Tropical Public Health 9d.

This course supplements the subject material on malaria offered in Microbiology-Tropical Public Health 1 a, b and Tropical Public Health 4c. Particular attention is given to problems now encountered in eradication and control programs. In the laboratory, experience is provided with procedures essential to the epidemiologic investigation of malaria.

Enrollment is subject to the approval of the Instructor.

Microbiology and Tropical Public Health 11d. Medical Mycology

Laboratory, conferences and field exercises. *One three-hour session and three hours of individual laboratory work each week, fourth period.* Associate Professor CAMPBELL and Staffs of the Departments.

Credit 2 units.

This course is designed to provide the student with the principles and techniques essential to the study of pathogenic fungi of medical and public health importance. The course consists of conferences, lectures and laboratory and field work under tutorial supervision. Emphasis is placed on the isolation of mycotic agents from cases in humans and sources in nature by *in vitro* and *in vivo* cultivation, and on identification by morphologic, biochemical and histologic characteristics. Procedures for soil baiting, soil sampling, skin and serologic tests, as adjuncts in establishing indirect or presumptive diagnosis and in defining geographic distribution and areas of high endemicity, are integral aspects of the course.

The course is designed to prepare graduates for laboratory research or field studies in the area of medical mycology.

Enrollment is subject to the approval of the Instructor.

SCHOOL OF PUBLIC HEALTH

Tropical Public Health 12b,c. Parasitic Infections of Man

Lectures, laboratory exercises and demonstrations. *Twelve afternoons, three-hour sessions, January and February.* Dr. WELLER, Dr. NEVA, Dr. CHERNIN, Dr. FROTHINGHAM, Dr. MICHELSON, Dr. PAN and Staff of the Department.

Credit 2 units.

This course is designed primarily for students in the School of Medicine. It is open, however, to a limited number of students registered in the School of Public Health. The important helminth and protozoan parasites of man are considered with reference to their geographic distribution, identification,



HARVARD UNIVERSITY

mode of transmission, pathogenesis, immune reactions, and methods for prevention and control. Clinical aspects and chemotherapy of parasitic diseases are discussed. Emphasis is given to methods of laboratory diagnosis. Arthropods of parasitologic importance are briefly surveyed.

Tropical Public Health 17a,b,c,d,e. Introduction to Laboratory Research

Laboratory exercises. Time and credit to be arranged.

Individual work for candidates at the Master's degree level may be carried out under supervision of a member of the Department. A variety of parasites of medical importance are maintained and are available for studies on metabolism, host-parasite relationships, and chemotherapy. Arrangements are subject to the approval of the Instructor.

Tropical Public Health 20. Research

Doctoral candidates or qualified full-time special students may undertake original investigations in the laboratory or in the field by arrangement with the Head of the Department.

Members of the Department are currently engaged in the following areas of research:

- (1) Tissue culture and immunological techniques as applied to problems in medical virology (Dr. Weller, Dr. Neva, and Dr. Frothingham).
- (2) Cultivation *in vitro* of parasitic helminths, protozoa, and other invertebrates of medical importance (Dr. Weller, Dr. Neva, Dr. Chernin, Dr. Frothingham, and Dr. Pan).
- (3) Biology, host-parasite relationships, and control of molluscan vectors of schistosomiasis and of other parasitic infections (Dr. Chernin, Dr. Michelson, and Dr. Pan).
- (4) Population genetics, nutrition, and reproduction of medically important arthropods (Dr. Spielman).
- (5) Arthropod transmission of viral, protozoan, and helminthic agents (Dr. Frothingham, Dr. Pan, and Dr. Spielman).

Department of Health Services Administration

ALONZO S. YERBY, S.B., M.D., M.P.H., Professor of Health Services Administration, Head of the Department, and Director of the Interfaculty Program on Health and Medical Care

WILLIAM J. CURRAN, LL.B., LL.M., S.M. IN HYG., Visiting Professor of Health Law

*ALFRED L. FRECHETTE, M.D., M.P.H., Clinical Professor of Public Health Practice; *Commissioner of Public Health, Commonwealth of Massachusetts*

MARJORIE A. C. YOUNG, S.B., ED.M., M.P.H., DR.P.H., Associate Professor of Health Education

ARTHUR R. JACOBS, A.B., M.D., M.P.H., Assistant Professor of Public Health

BASIL J. F. MOTT, A.B., M.P.A., PH.D., Assistant Professor of Health Services Administration

JEANNETTE J. SIMMONS, S.B., M.P.H., Lecturer on Health Education

*JACK KASTEN, B.S., M.P.H., LL.B., Lecturer on Health Services Administration; *Director, Clinical Services, Beth Israel Hospital*

*EDWARD B. KOVAR, A.B., A.M., Lecturer on Community Health Planning; *Director, Health, Hospitals and Medical Care Division, United Community Services*

*SAMUEL LEVEY, A.B., A.M., PH.D., S.M. IN HYG., Lecturer on Hospital Administration; *Director, Division of Nursing Homes and Related Facilities, Massachusetts Department of Public Health*

*HARRY T. PHILLIPS, M.B., CH.B., D.P.H., M.D., Lecturer on Health Services Administration; *Chief of Bureau of Chronic Disease Control, Massachusetts Department of Public Health, and Superintendent, Lemuel Shattuck Hospital*

*HOPE H. SNIDER, A.B., M.D., M.P.H., Lecturer on Medical Care; *Director, Pearl Aging Center, Peter Bent Brigham Hospital*

A. GERALD RENTHAL, A.B., M.D., M.P.H., Instructor in Health Services Administration

*HENRY WECHSLER, A.B., A.M., PH.D., Instructor in Social Psychology; *Research Director, The Medical Foundation, Inc.*

*JOSEPH A. YACOVONE, A.B., D.M.D., M.P.H., Instructor in Dental Public Health; *Chief, Division of Dental Public Health, Rhode Island Department of Health*

* Part-time in the School of Public Health.

HARVARD UNIVERSITY

The following members of other Harvard Faculties participate in teaching in the Department of Health Services Administration:

JOHN T. DUNLOP, A.B., PH.D., A.M. (hon.), David A. Wells Professor of Political Economy, Faculty of Arts and Sciences, Member of the Faculty of the School of Government

JAMES M. DUNNING, A.B., D.D.S., M.P.H., Professor and Head, Department of Ecological Dentistry, Harvard School of Dental Medicine

OSLER L. PETERSON, M.B., M.D., M.P.H., Visiting Professor of Preventive Medicine, Harvard Medical School and Member of the Faculty of the School of Government

RALPH E. BERRY, JR., A.B., A.M., PH.D., Assistant Professor of Economics, Faculty of Arts and Sciences

Dr. Alonzo S. Yerby



SCHOOL OF PUBLIC HEALTH

MARTIN S. FELDSTEIN, A.B., A.M., D.PHIL.OXON., Assistant Professor of Economics, Faculty of Arts and Sciences

CURTIS P. McLAUGHLIN, A.B., M.B.A., D.B.A., Assistant Professor of Business Administration, School of Business Administration

SIDNEY S. LEE, S.B., M.D., M.P.H., DR.P.H., Lecturer on Preventive Medicine, Harvard Medical School and Associate Dean of the Faculty of Medicine for Hospital Programs

ROBERT C. BUXTBAUM, A.B., M.D., Instructor in Preventive Medicine, Harvard Medical School; *Director of the Medical Clinics, Peter Bent Brigham Hospital*

Our contemporary health systems are in a dynamic state of change. Increasingly, health is considered to be a basic human right. Government is more and more being thrust into the health field, for the benefit of both the individual and the community. The increasing complexity of medical technology calls for diverse types of health organizations. This vast growth of organized health services has created an increased need for qualified administrators and researchers.

With the projection of the hospital into community health services and the health department into personal care services, a specialized field of health services administration is emerging. Leadership and research are required to ensure high quality service to both the individual and the community. Health professionals must do more than just provide service, they must be concerned with policy formation, administration, and research. One of the main goals of the Department of Health Services Administration is to provide this education for leadership in health service organizations. Emphasis is placed on planning, organization, delivery, and evaluation of health services. Efforts are made to adapt relevant concepts of administrative and organizational theory to the practical problems of providing health services. The Department is concerned with research designed to improve the methodology of measuring the effectiveness of health services and in the development and testing of models of health systems and sub-systems.

The important roles of government, voluntary agencies, and pre-payment insurance systems are also coming to the fore. In order to allow the potential health leader to meet the challenges of future change, the principles and techniques of administration, particularly planning and evaluation are emphasized. Traditional administrative techniques such as budget preparation, personnel management, and supervision are also treated. Since there are many problems broad in scope which must be studied, the resources of multiple disciplines and several Harvard faculties are carefully integrated into the program.

Since health services administration is fundamentally concerned with the physician and the hospital, the Department maintains close liaison relation-

HARVARD UNIVERSITY

ships with Harvard Medical School and with several Harvard University affiliated hospitals. Thus, to the Harvard School of Public Health's expertise in community health, preventive medicine, and research are added the resources of medical education, university hospitals, and the discipline of hospital administration. Since the teaching of health services administration also involves training in business administration and economics, liaison relationships have been developed between the School and the Harvard School of Business Administration and the Department of Economics of Harvard University. One other important element of community health services training is provided by the mutually beneficial and long standing relationship with the Massachusetts Department of Public Health.

Health Services Administration 1a,b. Provision of Health Services and Medical Care

Lectures and discussions. *Two two-hour sessions each week, first and second periods.* Dr. YERBY, Dr. SCHMIDT, and Staffs of the Departments. Credit 4 units.

Required of Master of Public Health candidates.

This course is offered jointly by the Department of Health Services Administration and the Department of Maternal and Child Health and forms the basis for additional courses in both departments. It emphasizes basic concepts essential in the planning, organization, and administration of government and private health programs for all age groups.

Among the subjects discussed are legal, sociocultural, and economic factors which affect the provision of health and medical care services; internal management of health agencies; characteristics of health agency interrelationships; health manpower requirements; and planning for medical care services.

Health Services Administration 2b,c,d. Departmental Seminar

Seminars. *One two-hour session each week, second, third and fourth periods.* Dr. JACOBS, Dr. YERBY, and Dr. MOTT.

Credit 3 units.

This seminar, primarily for students specializing in Health Services Administration, is presented in the form of three seminar sequences. The first sequence is devoted to health services for populations with high or peculiar risks of incurring disease, disability, or premature death. Consideration is given to programs for such groups as the aged, the poor, the disabled, and persons suffering from addictive diseases. The second sequence is concerned with political factors in the planning, organization, and delivery of health services. The third sequence consists of a comparative analysis of the organization and financing of personal health services in selected countries throughout the world.

SCHOOL OF PUBLIC HEALTH

Health Services Administration 3c,d. Techniques in Organization and Administration of Health Services

Seminars. *Two two-hour sessions each week, third and fourth periods.* Dr. YERBY and Staff of the Department.

Credit 4 units.

This course analyzes a number of areas important to health service policy-makers and administrators, including planning and decision-making processes, preparation of program plans and budgets, design of organizational structures, techniques of program supervision and control, management of personnel and financial resources, planning of health facilities, and research in administration. Case studies and exercises are used to focus discussion on public health practice.

Health Services Administration 4c,d. Issues in Medical Care (Economics 285b)

Seminars. *Two two-hour sessions each week, third and fourth periods.* Dr. PETERSON, Dr. YERBY, Dr. MOTT, Dr. BERRY, Dr. LEE, Dr. BUXBAUM, and Dr. RENTHAL.

Credit 4 units.

This interdisciplinary course deals in depth with major issues in the economics and administration of medical care programs. It is designed for graduate students from the Schools of Public Health, Medicine, Business Administration, and Government, and the Department of Economics. Seminars are conducted by the Interfaculty Committee on Health and Medical Care composed of representatives from the participating Schools. It is built on the foundations provided in the basic course, Provision of Health Services and Medical Care, 1a,b, offered in the first and second periods.

During the first section of the course, major issues concerning resources, organizational structure, methods of payment, and the need and demand for medical care are examined. Among the considerations explored are the organization of medical practice and health services, changing requirements for health manpower and facilities, quantitative and qualitative standards for medical care, and factors influencing the utilization, efficiency, and cost of medical care in the United States and other countries. Special reading materials selected and prepared by the seminar staff serve as the basis for seminar discussions.

In the second section of the course, emphasis is on analysis, planning, and decision making through the use of case studies on specific programs and problems in medical care. The subjects covered include government health plans; cost, utilization, structure, and quality of personal health services; and organizational and manpower problems in medical care programs.

HARVARD UNIVERSITY

Health Services Administration 5c,d. Health Education

Seminars. *One two-hour session each week, third and fourth periods.* Dr. YOUNG.

Credit 2 units.

This course emphasizes major aspects of learning theory, communication theory, educational methods, and health behavior; health education in the process of social change; psychosocial and cultural factors relevant to the planning of health education programs; and research and evaluation in health education. The major focus of the course is on health education aspects of community health programs, including school health services.

Health Services Administration 6d. Legal Problems of Organized Health Programs

Seminars. *One two-hour session each week, fourth period.* Professor CURRAN.

Credit 1 unit.

This course is designed for students who are particularly interested in the legal aspects of health programs.

Seminars include discussions of constitutional problems in public health programs, the legislative process, professional and legal standards for the health professions and in research, general considerations of administrative law, regulation making by health organizations, legal reforms in personal injury litigation, and the presentation of expert medical testimony.

Health Services Administration 7c,d. Dental Public Health Practice

Seminars and field visits. *One two-hour session each week, third and fourth periods.* Dr. Dunning and Dr. Yacovone.

Credit 2 units.

This seminar course is designed for dentists and for those of other disciplines who desire training in depth in the administration and planning of dental health programs. All phases of dental public health are covered including dental needs, resources, surveying, dental health education, fluoridation, prepayment, and evaluation of programs. Reading assignments are used to stimulate class discussion. Participants make field trips to several dental facilities. Students may elect to do advanced work in any phase of dental public health.

Health Services Administration 8c,d. Health and Economic Development

Lectures and discussion. *One two-hour session each week, third and fourth periods.* Dr. BERRY.

Credit 2 units.

SCHOOL OF PUBLIC HEALTH

This interdisciplinary course, focusing on the issues of economic development and health planning, is designed for students who have particular interest in the less developed nations.

The course provides the student with an introduction to economic analysis, the process of economic development, and the interrelationship of health and economic development. Topics considered include theories of economic development, economic planning, economic development in historical perspective, the current planning problems of the less developed countries, and the significance of health, human capital, and population to economic development. Problems of health planning in less developed countries and approaches to the integration of health planning and economic planning are discussed.

Health Services Administration 9a,b. Economics of Medical Care (Economics 285a)

Seminars. One two-hour session each week, first and second periods. Dr. BERRY and Dr. FELDSTEIN.

Credit 2 units.

This is an advanced interdisciplinary course for doctoral candidates at the schools and departments associated in the Interfaculty Program—the Schools of Public Health, Medicine, Government, Business Administration, and the Department of Economics—and for students with advanced standing at the School of Public Health.

The course is concerned with the application of the analytic framework and methodology of economics to a number of specific problems in the broad area of medical care. The emphasis is on the techniques of analysis and statistical measurement, and no attempt is made to treat the entire field of medical care comprehensively. Seminar faculty and faculty members of other institutions are invited to present their research findings on specific problems for critical examination by the group. Advanced students who are conducting research in medical care are also expected to report on their studies for discussion by the group.

The course is planned to increase students' substantive knowledge of the problems discussed and to develop their familiarity with concepts and techniques useful in the examination and solution of issues in the economics and administration of medical care.

Health Services Administration 10c,d. Administrative Problems in Medical Care

Seminars. One two-hour session each week, third and fourth periods. Dr. McLAUGHLIN, Dr. PETERSON, and other Members of the Harvard University Interfaculty Committee on Health and Medical Care.

HARVARD UNIVERSITY

Credit 2 units.

This is an advanced interdisciplinary course for doctoral candidates at the Schools and Departments associated in the Interfaculty Program, which includes students from Schools of Public Health, Medicine, Government, Business Administration, and the Department of Economics.

The course is concerned with the application of administrative concepts and techniques, such as organizational theory, decision theory, operations research, and systems analysis, to a variety of actual problems in medical care. Seminar faculty and faculty members of other institutions are invited to present their research findings on these problems for critical examination by the group. Students who are specializing in medical care are also expected to report on their studies for discussion by the group.

The course is designed to further increase students' substantive knowledge of the problems discussed and to develop their familiarity with concepts and techniques useful in the examination and solution of issues in the economics and administration of medical care.

Health Services Administration 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

Master's degree candidates may make arrangements to do individual and group work under the guidance of a staff member of the Department.

This work can include readings and special projects in such areas as dental health, medical care, and health education. In addition, field assignments to federal, state, and local government and private health organizations can be arranged.

Health Services Administration 20. Research

Doctoral candidates are offered the opportunity of undertaking individual study and research as the basis for a doctoral thesis.

Health Services Administration 30e. Assignments to Field Agencies

January 29—February 3, 1968.

Credit 1 unit.

Students are assigned to work in the field on special projects, on group surveys or other types of field projects, or for observation of, and limited participation in, the work of health agencies.

Field assignments are made on an individual basis to meet the special needs of each student insofar as possible. Work in the field is coordinated with courses in the Department.

Department of Maternal and Child Health

WILLIAM M. SCHMIDT, S.B., M.D., A.M. (hon.), Professor of Maternal and Child Health and Head of the Department

*LEON STERNFELD, S.B., M.D., PH.D., M.P.H., Associate Professor of Applied Maternal and Child Health; *Deputy Commissioner and Director of Local Health Services, Massachusetts Department of Public Health*

ISABELLE VALADIAN, M.D., M.P.H., Associate Professor of Maternal and Child Health

JAMES E. TEELE, A.B., A.M., PH.D., Assistant Professor of Sociology

*ARTHUR J. LESSER, A.B., M.D., M.P.H., Visiting Lecturer on Maternal and Child Health; *Deputy Chief, Children's Bureau, United States Department of Health, Education and Welfare*

*HELEN D. COHN, S.R.N., S.C.M., M.P.H., Instructor in Applied Public Health Nursing; *Assistant Professor of Public Health Nursing, Boston University School of Nursing*

*RUTH A. COWIN, S.B. S.M., Instructor in Applied Public Health Social Work

*ILSE E. GORBACH, A.B., M.D., M.P.H., Instructor in Applied Maternal and Child Health

*BENJAMIN SACHS, A.B., M.D., M.P.H., Instructor in Applied Maternal and Child Health; *Southeastern Regional Director, Massachusetts Department of Public Health*

ALFRED YANKAUER, A.B., M.D., M.P.H., Senior Research Associate in Maternal and Child Health

RUTH M. BUTLER, A.B., S.M., Research Associate in Social Work

LEO MILLER, A.B., S.M. IN S.S., M.P.H., PH.D., Research Associate in Social Work (through December 31, 1967)

CHARLYNE D. COSTIN, A.B., M.S.S.W., Assistant in Social Work

MIRIAM C. EKDAHL, S.B., S.M. IN S.S., Assistant in Social Work

The following individuals who hold appointments in Harvard Medical School participate in teaching in the Department of Maternal and Child Health

CHARLES A. JANEWAY, A.B., M.D., A.M. (hon.), *Thomas Morgan Rotch Professor of Pediatrics*

* Part-time in the School of Public Health.

HARVARD UNIVERSITY

DUNCAN E. REID, S.B., M.D., A.M. (hon.), *William Lambert Richardson Professor of Obstetrics*

CLEMENT A. SMITH, A.B., A.M., M.D., A.M., (hon.), S.D. (hon.), *Professor of Pediatrics at the Boston Lying-In Hospital*

WILLIAM BERENBERG, A.B., M.D., *Clinical Professor of Pediatrics*

ROBERT B. BERG, A.B., M.D., *Assistant Professor of Pediatrics at Beth Israel Hospital*

EVA J. SALBER, M.B., CH.B., DR.P.H., M.D., *Lecturer in Pediatrics*

JOEL J. ALPERT, A.B., M.D., *Associate in Pediatrics*

Maternal and Child Health Services, including Services for Handicapped Children, are seen as a part of the total public health program, national and local, and are discussed in terms of integration with related health services and medical care for all segments of the population. The Staff of the Department is responsible, together with the Department of Health Services Administration, for the presentation of the course, Provision of Health Services and Medical Care, which is required of Master of Public Health degree candidates and which may be elected by other students with the consent of the Instructor. (See page 116 for a description of this course.)

More intensive study of health problems in the field of Maternal and Child Health and of the aspects of programs and special methods which have been developed to serve mothers and children is offered in the Departmental seminars. Additional elective seminars are directed to research methods in growth and development, problems of adolescence, and welfare programs and their relation to public health.

Fellowships are available for students who have a major interest in Maternal and Child Health (see page 171). Candidates concentrating in Maternal and Child Health are normally expected to take the following courses in addition to satisfying the course requirements for the degree:

Maternal and Child Health 2b

Maternal and Child Health 3c,d

Maternal and Child Health 17b,c,d,e

Maternal and Child Health 30

Maternal and Child Health 2b. Departmental Seminar

Seminars. *One two-hour session each week, second period.* Dr. SCHMIDT and Staff of the Department.

Credit 1 unit.

This course is designed primarily for students concentrating in Maternal and Child Health. Selected aspects of programs which relate to mothers and children are examined through field visits, followed by class discussion.

SCHOOL OF PUBLIC HEALTH

Maternal and Child Health 3c,d. Problems and Programs in Maternal and Child Health

Seminars. *Two two-hour sessions each week, third and fourth periods.* Dr. SCHMIDT, Dr. VALADIAN, and Staff of the Department.

Credit 4 units.

This course includes presentation and discussion of programs in maternal and child health, services for handicapped children, related social problems, and available social services for mothers and children. During the fourth period sessions will be devoted to discussion of research and demonstrations, legislative developments, and to reports of students' projects, Maternal and Child Health 17b,c,d,e.

Maternal and Child Health 4c. Welfare Programs and Their Relation to Public Health

Seminars. *One two-hour session each week, third period.*

Credit 1 unit.

To be omitted in 1967-68.

This seminar course includes presentation and discussion of the evolution of public welfare services, with emphasis on the development of public welfare philosophy, principles, and programs. Although it is primarily focused on public welfare in the United States, reference is made to contrasting patterns in other countries. Public attitudes as they affect public welfare policy are analyzed. The relationships of public welfare and public health and the complementary nature of their services are emphasized, including present and potential methods of cooperation. Emphasis is placed on the present strengths and limitations of welfare programs and anticipated further developments.

Maternal and Child Health 5d. Research Approach to Growth, Development and Health of the Child

Seminars. *Two two-hour sessions each week, fourth period.* Dr. VALADIAN, Dr. REED and Staff of the Department.

Credit 2 units.

This course deals with methods of obtaining and evaluating data on child growth, development, and health, and the construction of norms. Particular attention is paid to problems involved in the study of interrelationships between various aspects of the child's progress and between the child and his background and environment.

Illustrative material is used from the Longitudinal Study of Child Health and Development conducted in this Department since 1930 by Dr. Harold C.

HARVARD UNIVERSITY

Stuart, Professor *Emeritus*, as well as data from other studies in this country and abroad.

Enrollment is subject to the approval of the Instructor.

Maternal and Child Health 6d. Adolescence and Youth: Sociological Concepts Related to Health Care

Lectures and seminars. *One two-hour session each week, fourth period.* Dr. TEELE and Staff of the Department.

Credit 1 unit.

This course is developed around a multi-disciplined approach to adolescent and youth behavior in the United States with material on sociopsychological theories and research in the field. Emphasis is placed upon a review of social science research on socialization practices, adolescent culture, and adolescent problems, including health problems. The aim of the course is to introduce the student to the apparent social and health consequences for youth of earlier familial influences with respect to health care, health attitudes, and child-rearing practices. In addition, the relationship of the structure of society to the growth and development of children and youth is considered.

Maternal and Child Health 17b,c,d,e. Tutorial Program

Time to be arranged, second, third and fourth periods.

Credit 2 or more units.

With advance approval by the Head of the Department, individual work under guidance may be arranged between the student and the adviser. Enrollment must be made during the first semester.

Maternal and Child Health 20. Research

Doctoral degree students may undertake research in Maternal and Child Health by arrangement with the Head of the Department.

Maternal and Child Health 30. Field Studies

i. January 29–February 3, 1968.

Credit 1 unit.

A field study in Puerto Rico is arranged in cooperation with the Department of Maternal and Child Health of the University of Puerto Rico, School of Medicine, Division of Preventive Medicine and Public Health. The work of the week is devoted mainly to an observation of Maternal and Child Health activities, including programs for handicapped children and family planning services.

Consent of the Head of the Department is required for admission to this

SCHOOL OF PUBLIC HEALTH

course. *Enrollment must be made by the end of the first period.* (See page 166 for an estimate of the cost.) Preference is given to students whose special field of interest is Maternal and Child Health. Other students may enroll, to the limit of capacity.

2. Other field experiences may be taken for credit during the year as time permits.

3. Students whose special field of interest is Maternal and Child Health and who do not have sufficient previous experience will be encouraged to have a period of field study before registration. Field study may also be undertaken after the completion of the academic year in a program arranged by the Staff of the Department. No credit.

Department of Nutrition

FREDRICK J. STARE, S.B., S.M., PH.D., M.D., A.M. (hon.), S.D. (hon.), D.Sc. (hon.), Professor of Nutrition and Head of the Department

D. MARK HEGSTED, S.B., S.M., PH.D., A.M. (hon.), Professor of Nutrition

JEAN MAYER, B.A., B.Sc., M.Sc., PH.D., D.Sc., A.M. (hon.), Professor of Nutrition and Lecturer on the History of Public Health. (Absent September 15, 1967 to March 14, 1968)

STANLEY N. GERSHOFF, A.B., S.M., PH.D., Associate Professor of Nutrition

ROBERT P. GEYER, S.B., S.M., PH.D., Associate Professor of Nutrition

BERNARD LOWN, S.B., M.D., Associate Professor of Cardiology in Public Health

*HARRY N. ANTONIADES, B.S., PH.D., Assistant Professor of Biochemistry; *Senior Investigator, The Protein Foundation, Inc.*

MANUEL G. HERRERA-ACENA, A.B., M.D., Assistant Professor of Medicine

MICHAEL C. LATHAM, B.A., M.D., D.T.M. & H., M.P.H., Assistant Professor of Nutrition

ROBERT B. MCGANDY, A.B., M.D., M.P.H., Assistant Professor of Nutrition

CLIFTON A. BAILE, S.B., PH.D., Instructor in Nutrition

MADGE L. MYERS, A.B., S.M., Instructor in Nutrition

PATRICIA S. REMMELL, S.B., S.M., Instructor in Nutrition

ROBERT R. PENSINGER, A.B., S.M., B.V.S., D.V.M., Research Associate in Veterinary Physiology

CARL C. SELTZER, A.B., PH.D., Research Associate in Physical Anthropology

CARLO BRUNI, M.D., Research Associate in Pathology

JEANNETTE H. FORSYTH, A.B., PH.D., Research Associate in Nutrition

WILLIAM B. HOOD, JR., S.B., M.D., Research Associate in Medicine (through October 31, 1967)

MARY B. McCANN, S.B., M.P.H., M.D., Research Associate in Nutrition

HARRY L. McCOMBS, S.B., M.D., Research Associate in Pathology

*JOSEPH M. MILLER, A.B., M.D., M.P.H., Research Associate in Medicine; *Associate in Medicine, Peter Bent Brigham Hospital and Medical Director, Massachusetts Bay Transportation Authority*

*HERNAN VELEZ, M.D., Clinical Research Associate in Nutrition; *Associate Professor of Internal Medicine, School of Medicine, University of Medellin, Colombia*

* Part-time in the School of Public Health.

SCHOOL OF PUBLIC HEALTH

NORBERT L. WIECH, S.B., S.M., PH.D., Research Associate in Nutrition
JESUS A. BIANCO, M.D., Research Fellow in Nutrition
ROBERT A. ENGLAND, A.B., M.D., Research Fellow in Nutrition
ZVI GLICK, B.SC., S.M., PH.D., Research Fellow in Nutrition
MIRIAM F. KELTY, B.A., M.A., PH.D., Research Fellow in Nutrition
ARTHUR W. MAHONEY, S.B., PH.D., Research Fellow in Nutrition
AVRAHAM RESHEF, M.D., M.P.H., Research Fellow in Nutrition (through December 31, 1967)
DENNIS J. SABO, S.B., S.M., PH.D., Research Fellow in Nutrition
ERWIN SCHARRER, DR.MED.VET., Research Fellow in Nutrition (through December 31, 1967)
DONALD W. THOMAS, A.B., A.M., PH.D., Research Fellow in Nutrition
CARLOS E. VASSAUX, B.S., M.D., Research Fellow in Nutrition
BRUCE I. VELTMAN, S.B., S.M., PH.D., Research Fellow in Nutrition
AMNON WACHMAN, S.B., M.D., Research Fellow in Nutrition
RICHARD B. WHITING, M.D., Research Fellow in Nutrition
STEPHAN A. YENIKOMSHIAN, B.SC., M.D., Research Fellow in Nutrition
ETHEL J. BOWIE, S.B., Assistant in Nutrition
DOROTHY BRUNO, S.B., Assistant in Nutrition
JANE A. SCHOONMAKER, S.B., S.M., Assistant in Nutrition

JAMES H. SHAW, B.A., S.M., PH.D., A.M. (hon.), *Professor of Nutrition, Harvard School of Dental Medicine*
IRA GORE, A.B., M.D., *Lecturer on Pathology, Harvard Medical School*
DANIEL S. BERNSTEIN, A.B., M.D., *Associate in Medicine, Harvard Medical School*
RONALD D. HUNT, S.B., D.V.M., *Research Associate in Pathology, Harvard Medical School*

The Department of Nutrition is concerned with basic and applied investigations in the science of nutrition in the areas of biochemistry, physiology, pathology, and psychology. Many of these are oriented toward problems of contemporary public health importance, such as cardiovascular diseases, obesity, and osteoporosis. The Department also has programs dealing with general nutritional and health problems in various countries in South America, Africa, and Asia.

In addition to the courses available in the School of Public Health, students may take graduate courses in the other Schools of Harvard University and

HARVARD UNIVERSITY

at the Massachusetts Institute of Technology. Thus, a program leading to the Doctor of Science degree might include courses in nutrition, biochemistry, biostatistics and epidemiology, physiology, and bacteriology, as well as advanced courses in these and related fields, such as organic and physical chemistry and biology. Appropriate programs are available for individuals whose interests lie in community nutrition rather than in laboratory nutrition and biochemistry.

Candidates for the Master of Public Health degree who elect to concentrate in Nutrition are normally expected to take the following courses in addition to satisfying the formal course requirements for the degree:

Nutrition 1a,b and at least one other course offered by the Department of Nutrition.

Nutrition 1a,b. Public Health Nutrition

Lectures. One one-hour session each week, first and second periods. Dr. STARE, Dr. GERSHOFF, and Dr. McGANDY.

Credit 1 unit.

Required of Master of Public Health candidates.

This course deals with the science of nutrition and its application to problems of human nutrition such as atherosclerosis, obesity, and metabolic disorders. Nutrition surveys and their evaluation, methods for establishing and meeting nutritional requirements, especially in countries with unfavorable economic conditions are discussed. The etiology, treatment and prevention of disorders related to nutrition are considered.

Nutrition 2b,c,d. Departmental Seminar

Seminars. One two-hour session each week, second, third and fourth periods. Staff of the Department.

Credit 3 units.

Students are expected to summarize and criticize recent publications on assigned topics in nutrition. Attention is placed on validity of experimental designs in nutritional research. Topics include the biochemical, physiological, psychological, and sociological aspects of nutrition.

Nutrition 3c,d. Advanced Topics in Nutrition

Lectures, discussions and required reading. One two-hour session each week, third period; two two-hour sessions each week, fourth period. Dr. HEGSTED, Dr. MAYER and Dr. GERSHOFF.

Credit 3 units.

The nutritional aspects of metabolism of carbohydrates, fats, proteins, vitamins, and essential minerals are considered in detail. Mechanisms of regu-

SCHOOL OF PUBLIC HEALTH

lation and behavioral aspects of food and fluid intake, calorimetry, genetic factors in nutrition, comparative requirements of various species are examined.

This course is intended primarily for students majoring in nutrition but can be taken by other adequately prepared students by the consent of the Instructors.

Nutrition 4c,d. Laboratory Techniques

Lectures and demonstrations. *One two-hour session each week, third and fourth periods.* Dr. GEYER and Dr. ANTONIADES.

Credit 2 units. Additional credits can be arranged for those desiring extra laboratory instruction.

This course is a survey of methods pertinent to laboratory research. The material covered includes biophysical and chemical techniques. Students participate in laboratory exercises on such general topics as chromatography, spectroscopy, microbiological assay, manometric measurements, and purified diet techniques. They are then instructed in the actual laboratory procedure pertaining to these techniques.

Prerequisite: A basic course in biochemistry.

Enrollment is subject to the approval of the Instructor.

Nutrition 5d. Nutritional Surveys

Lectures, discussions and laboratory exercises. *One two-hour session each week, fourth period.* Dr. GERSHOFF and Dr. McGANDY.

Credit 1 unit.

Methods of obtaining dietary information, principles of nutritional surveys; assessment of nutritional status in public health programs and clinical research are examined and discussed. Laboratory work consists of practical exercises in evaluating diets and surveys.

Nutrition 6c,d. Nutritional Aspects of Human Disease

Lectures, discussions and demonstrations. *One two-hour session each week, third and fourth periods.* Dr. HERRERA-ACENA, Dr. LOWN, and Dr. MILLER.

Credit 2 units.

This course considers in detail the application of current nutritional knowledge to areas of clinical medicine where nutritional deficiency or dietary management is of major importance. The assessment of nutritional status, the diagnosis and management of common deficiency diseases, and the role of nutrition in the etiology and treatment of the chronic and degenerative diseases are discussed.

HARVARD UNIVERSITY

Nutrition 7d. International Nutrition Policy and Programs

Seminars and discussions. *One two-hour session each week, fourth period.*
Dr. LATHAM.

Credit 1 unit.

This course is designed to cover food and nutrition policy in developing countries. The planning, execution, and evaluation of applied nutrition programs will be described. The need for coordination of efforts by the various government ministries or departments, including those of agriculture, education, economics, health and community development, will be stressed. The course includes discussion of such topics as the place of food and nutrition programs in relation to economic development; education and training in nutrition; the importance of social and cultural factors; methods of increasing the use of protein-rich foods; the role of FAO, WHO, UNICEF, and the voluntary agencies; action in case of famine; research and investigation as a tool for preventive action; the place of nutrition rehabilitation centers and MCH services; and the integration of nutrition with other projects of disease control in tropical areas.

Enrollment is limited and is subject to the approval of the Instructor.

Nutrition 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged.

Individual work, under direction, may be arranged for students at the master's level. This may include laboratory studies or projects in applied nutrition.



Nutrition 20. Research

Time and credit to be arranged.

Facilities are available for students at the doctoral level to do advanced work in nutrition along the lines of fundamental research or applied nutrition in public health and medicine. Areas currently receiving intensive and comprehensive study in the Department are as follows:

The effect of nutrition and other environmental factors on the etiology of heart disease in man; nutrition education; fluoride in human nutrition as a preventive for tooth decay and osteoporosis; cooperative international researches in nutrition. (Dr. STARE)

The nutritive value of proteins and protein requirements; dietary effects on the metabolism of cholesterol in animals and man; the influence of diet on the metabolism of adipose tissue; nutritional requirements for calcium and for bone formation. (Dr. HEGSTED)

Neurophysiological and metabolic aspects of the regulation of food and fluid intake in monogastric animals and ruminants; studies of feeding in rodents, ruminants, and primates; experimental obesity; anthropological, metabolic, and behavioral studies of obesity in children and adolescents; psychological aspects of nutrition in man. (Dr. MAYER)

Lipid metabolism in tissue culture cells; polyvalent metal metabolism in soft tissue; effects of CO_2 deprivation on tissue culture cells. (Dr. GEYER)

The effects of nutritional deficiencies on endocrine metabolism; the etiology of urolithiasis in experimental animals and man; vitamin metabolism; interrelationships between nutrition and endocrine function. (Dr. GERSHOFF)

Coronary artery disease; etiology of sudden death; derangements of the heart beat; exercise physiology; electrolyte metabolism. (Dr. LOWN)

Clinical and experimental studies on circulating lipids and atherosclerosis. (Dr. McGANDY)

Protein isolation and characterization; hormone biochemistry and metabolism. (Dr. ANTONIADES)

Endocrine, nutritional, and metabolic aspects of diabetes. (Dr. HERRERA-ACENA)

Admission is limited and is subject to the approval of the Instructor.

Department of Behavioral Sciences

ALEXANDER H. LEIGHTON, A.B., A.M., M.D., Professor of Social Psychiatry and Head of the Department

SYDNEY H. CROOG, A.B., A.M., PH.D., Associate Professor of Sociology

MORTON BEISER, M.D., Assistant Professor of Social Psychiatry

JANE M. MURPHY, A.B., PH.D., Assistant Professor of Anthropology

DAVID S. SHAPIRO, A.B., PH.D., Lecturer on Social Psychiatry

HARBEN J. BOUTOURLINE-YOUNG, M.B., B.S., D.C.H., M.D., Research Associate in Human Growth and Development

ROBERT A. DANLEY, A.B., S.M., PH.D., Research Associate in Sociology

ROBERT C. BENFARI, A.B., A.M., PH.D., S.M. IN HYG., Research Associate in Psychology

*A. PHILIP CONNELLY, JR., A.B., M.D., Research Associate in Medicine; *Assistant Physician, University Health Services*

*ALICE L. NANGERONI, A.B., Research Associate in Behavioral Sciences; *Assistant to the Chairman, Department of Sociology, Cornell University*

VICTOR G. CARDOZA, Field Project Administrator

AMORITA C. SUAREZ, S.B., Assistant in Behavioral Sciences

*RODERICK A. ARMSTRONG, B.A., L.M., S.S.A., Research Consultant in Social Psychiatry; *Executive Director, Digby-Annapolis Mental Health Service Board, Inc.*

*JEAN-NOEL FORTIN, B.A., M.A., M.D., Consultant in Psychiatry; *Associate Professor of Psychiatry, University of Montreal*

*JOHN S. HARDING, A.B., A.M., PH.D., Research Consultant in Psychology; *Professor, Department of Child Development and Family Relationships, Cornell University*

*EDGAR B. MCKAY, S.B., ED.M., Consultant in Sociology; *Associate Professor of Modern Society, University of Maine*

*DANIEL J. O'CONNELL, M.D., Consultant in Psychiatry; *Executive Secretary, Association of American Indian Affairs*

The Department of Behavioral Sciences has a primary concern with the relationship of social and cultural factors to mental health and mental illness. Allied to this is an interest in the way social, cultural, and psychological factors affect the development and effectiveness of planned changes, particularly those involving public health programs.

* Part-time in the School of Public Health.

SCHOOL OF PUBLIC HEALTH

Students have the opportunity to study psychiatric epidemiology, cross-cultural psychiatry, the characteristics of community services, medical sociology, and the role of cultural factors in health and disease. Because of its crucial importance to all aspects of public health, special attention is given to studying factors which affect program acceptance—why people accept or reject certain public health programs. Throughout the curriculum considerable emphasis is given to research and research methodology.

The Department's teaching plan is therefore geared both to the student who has a social science background and wishes to know more about mental health and illness, and to the student who has a clinical orientation and wishes to know more about the social, cultural, and psychological influences which shape the human community. To supplement Departmental and School resources to achieve this end, the student may take additional courses in other parts of Harvard University such as the Department of Psychiatry and the Department of Social Relations.

The current research of the Department is focused on longitudinal community studies of mental health and mental illness, comparative psychiatric epidemiology, the effects of social and cultural change, the adjustment and adaptive processes of individuals and families after severe illness, the evaluation of psychiatric preventive measures, and the effects of intervention. In addition to being concerned with causal relationships and the building of significant theory, Departmental members give major weight to the development of methods, the revision of concepts, and the testing of reliability and validity of mental health survey techniques. Doctoral candidates and fellows have the opportunity of sharing in these studies as team members, and also of selecting a segment for independent investigation.

Behavioral Sciences 1a,b. An Introduction to Behavioral Sciences

Lectures. *Two one-hour sessions each week, first and second periods.* Dr. LEIGHTON and Staff of the Department.

Credit 2 units.

Required of Master of Public Health candidates.

The behavioral sciences, encompassing such disciplines as sociology, anthropology, psychology, and psychiatry, are highly relevant to many areas of public health practice, programing, and research. It is obviously impossible to present even a cursory review of all pertinent behavioral science subject matter; therefore, material for this course is selected on the basis of its relevance to public health in general. The course also provides the required background for advanced courses given by the Departments of Behavioral Sciences, Health Services Administration, and Maternal and Child Health. The approach is illustrative rather than encyclopedic and covers a range of subjects—from such matters as brain function, learning and perception, to the behavior of human groups.

HARVARD UNIVERSITY

The first of three aims of this course is to survey the present state of social science concepts, theories and methods of research. The second aim is to highlight information, theories, and methods of practical application of the behavioral sciences that will be of use to the policy-maker, the planner, and the teacher. This means attention to the patterning and functioning of health agencies, the factors that influence the acceptance or rejection of public health programs, and the special issues characteristic of poverty and situations of cultural contrast and change. The third area of emphasis is social psychiatry. This new and expanding public health field is examined with particular reference to the prevalence of psychiatric disorders, their social causes, and preventive measures.

Behavioral Sciences 2b. Departmental Seminar

Seminars. *One two-hour session each week, second period.* Dr. LEIGHTON and Staff of the Department.

Credit 1 unit.

The Departmental Seminar is a supplement to 1a,b. It provides a discussion group and additional selected readings for those students who wish to expand their studies of the behavioral sciences.

Behavioral Sciences 3b. The Assessment of Mental Health

Laboratory. *One two-hour session and two hours of laboratory work to be arranged each week, second period.* Dr. BEISER.

Credit 2 units.

This course is concerned with training in a systematic technique for making psychiatric health ratings of individuals. It provides an opportunity to acquire skill in a type of procedure that is fundamental to making surveys of communities. It also gives first-hand experience with some new ways of viewing mental illness that are emerging from social psychiatry.

Prerequisite: Two years of training in Psychiatry or a degree in Clinical Psychology.

Enrollment is subject to the approval of the Instructor.

Behavioral Sciences 4c. The Epidemiology of Psychiatric Disorders

Seminars. *One two-hour session each week, third period.* Dr. LEIGHTON.

Credit 1 unit.

To be given in 1968-69.

This course reviews present knowledge regarding the prevalence and incidence of psychiatric disorders with particular attention being paid to etiological questions and the problems of control. Attention is focused on main categories of disorders, such as psychosis, neurosis, brain syndrome, and

mental deficiency. Particular emphasis is given to matters of conceptualization and methods which confront the advance of research in this field.

Biostatistics and Behavioral Sciences 5c,d. Research Methods in Planning and Evaluation

Lectures and discussions. *Two two-hour sessions each week, third and fourth periods.* Dr. REED, Dr. FELDMAN and Staff of the Behavioral Sciences Department.

Credit 4 units.

The focus of this course is on population-survey and related social-research techniques as they apply to problems of health program planning and evaluation. Various constituent elements of the investigative process, including research design, sample selection, questionnaire construction, and the reduction and interpretation of data are subjected to critical examination. As laboratory exercises, students employ the methodology covered by the course in developing research plans and instruments which are relevant to the problems of an ongoing health program. These plans and instruments are discussed in seminar sessions.

Enrollment is limited and is subject to the approval of the Instructor.

Behavioral Sciences 6d. Cross-Cultural Psychiatry

Lectures and Seminars. *One two-hour session each week, fourth period.* Dr. MURPHY.

Credit 1 unit.

To be given in 1968-69.

This course is designed for public health workers who desire to increase their knowledge regarding mental health and mental illness in contrasting cultural groups. The ground covered includes cultural relativity, cross-cultural epidemiology of psychiatric disorders, and the effects of rapid cultural change, poverty, and sociocultural disintegration. Indigenous practices for the treatment of the mentally ill in non-Western societies are described and their implications discussed. Various contemporary experiments concerned with meeting the psychiatric needs of developing countries are examined.

Admission is subject to the approval of the Instructor.

Behavioral Sciences 7c. Critical Issues in Community Psychiatry

Seminars. *One two-hour session and two hours of laboratory and field work each week, third period.* Dr. BEISER and Dr. SHAPIRO.

Credit 2 units.

This series of eight seminars deals with the development of the community

HARVARD UNIVERSITY

mental health movement in its relationship to psychiatry, public health, and social welfare. The prevention of psychiatric disorder is given special attention as representing a crucial social issue of general concern. Preventive programs, both past and present, are critically examined. In addition, students are given individual reading assignments.

Behavioral Sciences 8c,d. Health and Illness in Cross-Cultural Perspective

Lectures and discussion. *One two-hour session each week, third and fourth periods.* Dr. MURPHY.

Credit 2 units.

Sociocultural factors bear numerous kinds of relationships to physical and mental illness. This course is designed for public health and social science students who seek greater understanding of these relationships. Attention will be given to different cultural definitions of the health-illness continuum and of the meaning of physical pain, intra-psychic disturbance, and social maladjustment. A selection of concepts from the social sciences will be reviewed in terms of their relevance to the origin and outcome of illness patterns. These include role, family, social class, cultural change, and community functioning. Case materials and research examples draw upon studies of non-Western groups and ethnic sub-groups within Euro-American society.

Enrollment is subject to the approval of the Instructor.

Behavioral Sciences 9c. Sociological Functioning of Health Agencies

Seminars. *One two-hour session each week, third period.* Dr. CROOG.

Credit 1 unit.

This course offers a comparative sociological review of the structure and function of major types of organizations involved in the provision of health services and programs, including the general hospital, mental hospital, local health department, and state and federal health services. It includes the analysis of major ways in which elements of the organization may promote or impede the achievement of goals. Attention is given to varying modes of administrative management, motivations of personnel, systems of control, problems in acquiring resources, and patterns of inter-agency relationships.

Behavioral Sciences 10d. Inducing Social Change

Seminars. *One two-hour session each week, fourth period.* Staff of the Department.

Credit 1 unit.

This course is designed for various specialists in public health who are charged with responsibility for introducing changes in organizations and

SCHOOL OF PUBLIC HEALTH

communities. The subject matter includes methods and theories of teaching, principles of individual and group psychotherapy, approaches to sensitivity training and group dynamics, and organizational theory. Techniques and procedures illustrating these theories are presented. The general aim of familiarizing students with existing theories and techniques of inducing social changes in a rational manner is pursued through readings, discussions, and case illustrations.

Behavioral Sciences 11d. Training in Mental Health Counseling

Seminars and laboratory. One two-hour session and two hours to be arranged each week, fourth period. Dr. SHAPIRO.

Credit 2 units.

This course is concerned with providing training in mental health counseling. It presents standardized techniques of case management, counseling, and referral, which may be incorporated into the practices of physicians, clergymen, public health nurses, social welfare workers, and others. Much of the course is conducted with case studies. Special consideration is given to techniques of organizing and evaluating mental health training programs.

Enrollment is subject to the approval of the Instructor.

Behavioral Sciences 17a,b,c,d,e. Tutorial Program

Time and credit to be arranged. Staff of the Department.

For departmental majors. Arrangements can be made for a reading course in selected topics or practical experience in research.

Behavioral Sciences 20a,b,c,d. Research Training

Training in research is available to doctoral candidates through individual arrangements with the Staff of the Department.

Behavioral Sciences 30e. Field Study

A limited number of openings exist for research experience in the Department's field stations. These opportunities vary in nature from time to time according to the stages of various research projects. Individual arrangements can be made through the Head of the Department.

Center for Population Studies

**Roger Revelle, A.B., Ph.D., Sc.D. (hon.), A.M. (hon.),
Richard Saltonstall Professor of Population Policy and
Director of the Center**

ROY O. GREEP, S.B., S.M., PH.D., A.M. (hon.), S.D. (hon.), John Rock Professor of Population Studies; Director of the Laboratory of Human Reproduction and Reproductive Biology, Harvard Medical School

HILTON A. SALHANICK, A.B., A.M., PH.D., M.D., Member of the Center for Population Studies; Professor of Obstetrics and Gynecology, Harvard Medical School

HAROLD A. THOMAS, JR., S.B., S.M., S.D., Member of the Center for Population Studies; Gordon McKay Professor of Civil and Sanitary Engineering

HARVEY LEIBENSTEIN, S.B., A.M., PH.D., Member of the Center for Population Studies; Andelot Professor of Economics and Population, Department of Economics, Harvard University

ROBERT DORFMAN, A.B., A.M., PH.D., A.M. (hon.), Member of the Center for Population Studies; Professor of Economics, Department of Economics, Harvard University, Member of the Faculty of the School of Government

GINO GERMANI, LIC-EN-PHIL, Member of the Center for Population Studies; Monroe Gutman Professor of Latin American Affairs, Department of Social Relations, Harvard University

ARTHUR J. DYCK, A.B., A.M., PH.D., Member of the Center for Population Studies; Assistant Professor of Social Ethics, Harvard Divinity School

RALPH B. POTTER, JR., A.B., B.D., TH.D., Member of the Center for Population Studies; Assistant Professor of Social Ethics, Harvard Divinity School

GEORGE I. FUJIMOTO, A.B., S.M., PH.D., Visiting Lecturer on Population Studies (from September 1, 1967 through February 29, 1968)

MURRAY SAFFRAN, B.SC., M.SC., PH.D., Visiting Lecturer on Population Studies

JOHN B. WYON, B.A., M.B., B.C.H., M.P.H., Senior Research Associate and Lecturer on Population Studies

CARL J. BAJEMA, S.B., A.M., PH.D., Research Associate in Population Studies

***GRETCHEN M. BERGGREN, A.B., M.D., S.M. IN HYG., Research Associate in Demography and Human Ecology; Physician, Hôpital Albert Schweitzer, Haiti**

***ROSE E. FRISCH, A.B., A.M., PH.D., Research Associate in Population Studies**

SCHOOL OF PUBLIC HEALTH

HELEN GIDEON, M.B., B.S., M.P.H., Research Associate in Population Studies
(Absent 1967-68)

CHARLES NEAVE, A.B., M.D., M.P.H., Research Associate in Population Studies
(From September 1, 1967)

PETER P. ROGERS, B.ENG., S.M., PH.D., Research Associate in Population Studies;
Lecturer on Computer Graphics, Harvard School of Design

CONSTANTINA SAFILIOS-ROTHSCHILD, S.M., PH.D., Research Associate in Population Studies

VYTAUTAS I. UZGIRIS, A.B., S.B., M.D., PH.D., Research Associate in Population Studies

PAULINE S. WYCKOFF, A.B., Executive Secretary of the Center for Population Studies and Administrative Assistant to the Dean

WILMA E. WINTERS, S.B. IN ED., A.M., S.M., Librarian of the Center for Population Studies

The Center for Population Studies was established in 1964 under the leadership of the School of Public Health as a University-wide Center to help scholars and scientists in different fields join in a common attack on human population problems. The Members of the Center are concerned with teaching and research on the history, dynamics, and means of control of human population changes; the physiology of reproduction; the psychology and sociology of human fertility; interactions between resource development and population growth; questions of health, nutrition, education, and moral values related to population problems; and the biophysical and social environments of human populations.

A Faculty Advisory Committee guides the operation and development of the Center. Seven of the Faculties of Harvard University are represented on this Committee: Arts and Sciences, Design, Divinity, Education, Medicine, Government, and Public Health. The Faculty of the Center includes members of the Departments of Economics and Social Relations, the Division of Engineering and Applied Physics, and the Schools of Public Health, Medicine, and Divinity. Two headquarters are maintained, one in Boston in the School of Public Health, and one in Cambridge.

In the School of Public Health, the Department of Demography and Human Ecology, as an integral part of the Center for Population Studies, conducts a program of research and teaching on public health aspects of population problems. The Department welcomes qualified candidates for the various degrees offered by the School of Public Health who wish to concentrate on these problems. Elsewhere in the University, courses and seminars open to all qualified students are given by Members of the Center in the Departments of Economics and Social Relations, in the Medical School, and the Divinity School.

HARVARD UNIVERSITY

At present, the Center is supporting pre- and post-doctoral research in demography, public health and fertility control, human reproductive physiology, religious attitudes toward fertility control, relations between population growth and economic and social development, and the sociological problems related to changes in human fertility patterns. Several broad research projects are being initiated, both in the United States and overseas, and these will provide further opportunities for graduate, post-doctoral, and faculty research.

Department of Demography and Human Ecology

JOHN C. SNYDER, A.B., M.D., LL.D., Henry Pickering Walcott Professor of Public Health and Chairman of the Department

ROY O. GREEP, S.B., S.M., PH.D., A.M. (hon.) S.D. (hon.), John Rock Professor of Population Studies; *Director of the Laboratory of Human Reproduction and Reproductive Biology, Harvard Medical School*

ROGER REVELLE, A.B., PH.D., SC.D., (hon.), A.M. (hon.), Richard Saltonstall Professor of Population Policy and Director of the Center for Population Studies

HILTON A. SALHANICK, A.B., A.M., PH.D., M.D., Member of the Center for Population Studies; *Professor of Obstetrics and Gynecology, Harvard Medical School*

DIETER KOCH-WESER, M.D., S.M., PH.D., Associate Professor of Tropical Health and Human Ecology; *Associate Dean for International Programs, Harvard Medical School*

JOHN B. WYON, B.A., M.B., B.C.H., M.P.H., Senior Research Associate and Lecturer on Population Studies

DAVID M. HEER, A.B., A.M., PH.D., Assistant Professor of Biostatistics and Demography

STEPHEN J. PLANK, PH.B., A.B., M.D., M.P.H., DR.P.H., Assistant Professor of Population Studies

*GRETCHEN M. BERGGREN, A.B., M.D., S.M. IN HYG., Research Associate in Demography and Human Ecology; *Physician, Hôpital Albert Schweitzer, Haiti*

HELEN GIDEON, M.B., B.S., M.P.H., Research Associate in Population Studies (Absent 1967-68)

CHARLES NEAVE, A.B., M.D., M.P.H., Research Associate in Population Studies (From September 1, 1967)

RODRIGO GUERRERO, M.D., S.M. IN HYG., Teaching Fellow in Demography and Human Ecology

The advances of the past century in science, technology, and economic development have revealed unprecedented opportunities for improving the quality of life for much of mankind. Among these opportunities there are several in the field of public health which have been the basis for large-scale programs aimed at prevention and control of major diseases, such as malaria and smallpox. But the striking successes in reducing morbidity and mortality from epidemic diseases have not been consistently accompanied by improve-

HARVARD UNIVERSITY

ment in the conditions of life. Moreover, the rapid expansion of population in many parts of the world is thwarting the current efforts to provide better housing, education, nutrition, health services and medical care. The disparity between rates of population increase and rates of development of human and economic resources is a crucial problem confronting society.

Acting under the conviction that the health professions can and should participate in general efforts to improve the quality of human life, the Harvard School of Public Health established the Department of Demography and Human Ecology in 1962. By this undertaking the School accepted the responsibility to include problems of human fertility and population growth among the basic factors affecting the health of people and therefore of major importance to success in providing comprehensive health services and medical care for communities and nations throughout the world.

The Department has developed courses of instruction in the biological and social processes which influence population change, in the current means available to control human fertility, and in the physiology of human reproduction. As the Department increases its resources these courses of instruction will be broadened considerably. The formal courses and the tutorial instruction of the Department are planned to prepare students for effective participation in population programs as administrators, research workers, or educators.

The courses of instruction listed below are those intended primarily for students enrolled in the Harvard School of Public Health, but may be elected by students in other parts of Harvard or by other qualified persons who fulfil the criteria for admission as special students.

Candidates for the Master of Public Health degree who elect to concentrate in Demography and Human Ecology are normally expected to take the following courses in addition to the general course requirements:

Demography 2b,c,d
Demography 3c
Demography 4c,d
Demography 5c,d
Demography 30e

Demography and Human Ecology 1a. Population Growth and Fertility Control

Lectures and seminars. *One two-hour session each week, first period.* Dr. PLANK and Staff of the Department.

Credit 1 unit.

Required of Master of Public Health candidates.

Major consideration is given to population growth and to the means of controlling fertility in the context of public health programs. Concepts of

ecology are developed to provide an understanding of the relationships between human populations and their environments. The physical, biological, and social forces which influence the demographic characteristics of a population are considered. Techniques for measuring these forces are presented, and their historical trends and future prospects are assessed.

Demography and Human Ecology 2b,c,d. Departmental Seminar

Seminars. *One two-hour session each week, second, third and fourth periods.* Dr. SNYDER and Staff of the Department.

Credit 3 units.

This course is oriented toward the research interests of those concentrating in the department. Each student selects a topic for special study on which he first presents a critical survey of the relevant literature and later the design of a project which would provide new information. During the initial sessions, and on occasion thereafter, staff members and guests report on their own investigations.

With the permission of the Instructor, students may elect Demography and Human Ecology 2c,d without having taken 2b.

Demography and Human Ecology 3c. Demographic Techniques

Lectures. *One two-hour session and one one-hour session each week, third period.*

Laboratory. *One two-hour session each week, third period.* Dr. HEER.

Credit 2 units.

A course on demographic techniques with emphasis on the correction of vital statistics and census data, measurement of nuptiality, fertility, contraceptive effectiveness and population growth, and on the preparation of population projections.

Prerequisite: Biostatistics 1a,b.

Demography and Human Ecology 4c,d. Physiology of Human Reproduction

Lectures. *One one-hour session each week, third and fourth periods.* Dr. SALHANICK, Staff of the Center for Population Studies, and Guest Lecturers.

Credit 1 unit.

The course presents the endocrinology of the sex hormones including their secretion, control, biosynthesis, biological effects and modes of action. The principal secretions to be considered are those of the hypothalamus, pituitary, and gonads. In addition, the processes of ovulation, spermatogenesis, fertilization and implantation are covered.

Enrollment is subject to the approval of the Instructor.

HARVARD UNIVERSITY

Demography and Human Ecology 5c,d. Readings in Population Studies

Seminars. *One two-hour session each week, third and fourth periods.* Dr. PLANK.

Credit 2 units.

This course is an introduction to the literature pertaining to population theory, research, and fertility control programs. It is offered for students concentrating in the Department. Seminar discussions are directed toward the analysis and evaluation of the assigned selections.

Demography and Human Ecology 6a,b. Problems of Population (Social Relations 192)

Lectures. *Three one-hour sessions each week, first and second periods.* Dr. HEER.

Credit 4 units.

This course reviews the history of the world's population and the social consequences of different population sizes and growth rates. Special attention is paid to a cross-cultural analysis of the social determinants of fertility, mortality and migration.

A term paper (20-25 pages) is a requirement for this course.

Demography and Human Ecology 17a,b,c,d. Tutorial Program

Time and credit to be arranged.

Students at the master's level may make arrangements for tutorial work and special reading on topics related to population problems. There may be an opportunity to consider the design of studies, programs or analysis of data.

Demography and Human Ecology 20. Research

Doctoral candidates may undertake research in the Department or may integrate research in this field with a doctoral program in another department.

Demography and Human Ecology 30e. Field Visits

January 29 to February 3, 1968.

Credit 1 unit.

Students majoring in the Department of Demography and Human Ecology participate in visits to organizations currently active in demographic studies, community education, and programs of research and service in fertility control.

Additional Field Study

At the end of the academic year, a field visit may be arranged for students majoring in the Department of Demography and Human Ecology.

Limited to ten students.

Interdepartmental Courses

Interdepartmental Course 1.2c,d. Public Health Policies

Lectures and seminars. *One two-hour session each week, third and fourth periods.* Dr. YERBY and the Faculty of the several Departments.

Credit 2 units.

Required of Master of Public Health candidates.

The course is concerned with contemporary problems of major public health importance. The exercises consider the process by which public policy is determined in the field of health. Discussions include identification of the social, political, scientific, and other factors which influence decisions in respect to priorities and specific courses of action. The role of the health professional in the formation of health policy and in bringing about planned change is examined. Relevant differences in national, regional or local health policy are considered, and students are given an opportunity to develop policies in respect to existing problems which effect the health of population groups.

Interdepartmental Course 1.1d History and Philosophy of Public Health

Lectures. *One two-hour session each week, fourth period.* Dr. MAYER.

Credit 1 unit.

Required of Master of Public Health candidates.

The course has two major purposes: to help the student of Public Health gain a picture of the development of his profession, and to use selected historical situations to illustrate how scientific knowledge has interacted in the past with political structure, economic status and cultural attitudes in the determination of the health goals of various societies and the execution of programs. In this light, the development of the science and practice of medicine, sanitary engineering and demography in Ancient Egypt, Greece and Alexandria, Rome, the Arab and European Middle Ages and the Renaissance is broadly sketched. The birth of the concept of a National Health Policy is traced to the Ages of Mercantilism and Enlightenment. The Sanitary Movement and its relation to the Industrial Revolution is examined with particular reference to Britain, France and the United States. An attempt is made to evaluate the extent to which the lessons of history have been used in the formulation of health policies in a changing world, both in industrial and in developing nations.

Finally, the broad concept of health utopias, the ideal state of medicine and health as envisaged by various cultures, are examined both in historical and in geographical perspectives.

HARVARD UNIVERSITY

Interdepartmental Course 3c,d. Seminar on Teaching of Preventive Medicine and Public Health

Seminars. *Two two-hour sessions each week, third and fourth periods.*
Dr. SEGALL.

Credit 4 units.

The seminars are designed for students who are preparing for careers as teachers of preventive medicine and public health. Components of the preventive medicine curriculum are considered with respect to course organization and instruction. Current aspects of educational theory relevant to the teaching of medical students are discussed by visiting specialists. Opportunity for field observation of teaching within selected departments of preventive medicine is provided.

Enrollment is limited and is subject to the approval of the Instructor.

Interdepartmental Course 17c,d. Tutorial Program in Teaching of Preventive Medicine and Public Health

Time and credit to be arranged. Dr. SEGALL.

An opportunity for tutorial work in curriculum design, development of methods of instruction and evaluation and other areas related to teaching preventive medicine and public health will be given interested students.

Prerequisite: Enrollment in Interdepartmental Course 3c,d.

FOUR

SPECIAL PROGRAMS

Programs in International Health

The School of Public Health has developed a Division of International Health. The primary objective of this Division is to utilize all departments and facilities of the School, as well as other related divisions of the University, to provide a comprehensive, effective, and efficient program of teaching, research, and service in all fields of international health.

The programs centered in the School, together with related course offerings in other divisions of Harvard University and the Massachusetts Institute of Technology, offer the student a broad background in preparation for future careers in the World Health Organization, the Agency for International Development of the U.S. State Department, the U.S. Public Health Service, the Peace Corps, the Armed Forces, industrial organizations, mission groups, philanthropic foundations, or with other governments and agencies providing varied careers in international health and in planning health services for developing countries.

The relevant course offerings are not concentrated in any one department of the School, since all departments have broad international interests in their respective fields. In addition to the requirements for the Master of Public Health degree, a varied selection of elective courses is available in the various Departments of the School in preparation for careers in international health.

Other divisions of Harvard University, namely the:

Faculty of Arts and Sciences
Graduate School of Government
Center for Middle Eastern Studies
East Asian Research Center and
Development Advisory Service of the
Center for International Affairs

provide additional opportunities for study in economics, public administration, anthropology, government, social relations, language,

HARVARD UNIVERSITY

and related subjects for students with special interests in particular regions of the world. Cross-registration opportunities for students interested in similar course offerings given by the Massachusetts Institute of Technology are also available. The various catalogues of these Faculties may be consulted for further details.

Programs of study may be selected leading to the Master of Public Health or Master of Science in Hygiene. Advanced students may be accepted as candidates for the Doctor of Public Health or Doctor of Science in Hygiene degrees. A three-year residency program for physicians preparing for certification by the American Board of Preventive Medicine in the area of General Preventive Medicine (International Health) is also available to selected students.

Areas in which supervised field work or research may be undertaken will vary, depending on current opportunities afforded and the availability of qualified supervision. For example, under the sponsorship of the Department of Tropical Public Health, trainees have been engaged in studies on schistosomiasis in Nigeria and Brazil, on malaria in Gambia, and on nutritional anemias in Uganda. The Department of Nutrition has sponsored trainees in nutritional studies in Colombia. Other relationships have been or are in the process of being established with the Hôpital Albert Schweitzer in Haiti, Ministry of Health in the Bahamas, Puerto Rico, Jamaica, Brazil, Tunisia, Italy, Israel, Lebanon, Saudi Arabia, Nigeria, and in other developing areas of the world. Assignments to international agencies for work experience or research activities abroad are made only when the School is assured that competent local supervision and guidance are available.

Examples of current international research being conducted by the School include trachoma research in Saudi Arabia and Lebanon; interrelationships of health and economic development in Tunisia; child growth and development in Italy; comparative heart disease studies in Ireland and U.S.; nutrition research in Colombia and Israel; population studies in Chile, Greece, United Arab Republic and India; research on Chagas' disease in Brazil; typhus in Yugoslavia; research on urinary calculi in Thailand; cooperative

cardiovascular disease investigation in Japan; relative importance of hereditary environmental factors in cardiovascular disease in Israel; collaborative studies on cervical cancer, breast cancer and leukemia involving numerous countries; and comparisons of prevalence of chronic respiratory disease between the United States and the United Kingdom, and the United States and Japan.



Dr. Richard H. Daggy

The School has sponsored triennial meetings of the *Industrial Council for Tropical Health* since 1950. These conferences bring together guest experts, members of the Faculty, and medical and managerial personnel of corporations having interests in tropical re-

HARVARD UNIVERSITY

gions for scientific and practical discussions of health problems. Through these conferences the School has established a wealth of international contacts which are of mutual benefit to industry, the School, its students, and alumni throughout the world.

International House, the School's residence for its graduate students and their families, both from the United States and abroad, provides an unusual opportunity for international contacts and extracurricular activities with professional health workers from a variety of countries. Some twenty-two to twenty-eight nations are represented in this group each year. Throughout the year there are opportunities for informal interchanges of ideas between students and their families. In addition, there are frequent discussions on topics of international interest, including presentations by international students on the culture, geography, social structure, and health problems of their home countries.

Finally, the Boston area as a whole provides a stimulating atmosphere for students interested in international affairs through such agencies as the local chapter of the Society for International Development, World Affairs Council, Pan American Society of New England, and many other agencies, programs and activities.

More current details on residency opportunities or other aspects of these programs may be obtained by addressing inquiries to Dr.

An International House tea



SCHOOL OF PUBLIC HEALTH

Richard H. Daggy, Associate Dean for International Programs at the School.

Participating Departments of the School and their representatives in the Division of International Health are listed below:

RICHARD H. DAGGY, S.B., S.M., PH.D. M.P.H., DR.P.H., Associate Dean of the Faculty of Public Health for International Programs, and Lecturer on Tropical Public Health.

Behavioral Sciences

JANE M. MURPHY, A.B., PH.D., Assistant Professor of Anthropology.

Biostatistics

JANE WORCESTER, A.B., DR.P.H., Professor of Biostatistics and Epidemiology.

Demography and Human Ecology

STEPHEN J. PLANK, PH.B., A.B., M.D., M.P.H., DR.P.H., Assistant Professor of Population Studies.

Epidemiology

ASCHER J. SEGALL, M.D., M.P.H., DR.P.H., Assistant Professor of Epidemiology.

Health Services Administration

ALONZO S. YERBY, S.B., M.D., M.P.H., Professor of Health Services Administration. Diplomate, American Board of Preventive Medicine (Public Health).

Maternal and Child Health

ISABELLE VALADIAN, M.D., M.P.H., Associate Professor of Maternal and Child Health. Diplomate, American Board of Preventive Medicine (Public Health).

Microbiology

EDWARD S. MURRAY, A.B., M.D., M.P.H., Professor of Microbiology. Diplomate, American Board of Internal Medicine.

Nutrition

JEAN MAYER, B.A., B.S.C., M.S.C., PH.D., D.S.C., A.M. (hon.), Professor of Nutrition and Lecturer on the History of Public Health.

Physiology

JOHN M. PETERS, S.B. M.D., M.P.H., S.D. IN HYG., Assistant Professor of Occupational Medicine.

HARVARD UNIVERSITY

Sanitary Engineering

ROBERT P. BURDEN, S.B., S.M., S.D., Assistant to the Dean *and* Administrative Associate, Water Quality Program, Division of Engineering and Applied Physics.

Tropical Public Health

THOMAS E. FROTHINGHAM, M.D., Associate Professor of Tropical Public Health. Diplomate, American Board of Pediatrics.

Harvard University Interfaculty Program on Health and Medical Care

The Interfaculty Program on Health and Medical Care is a co-operative undertaking of the Schools of Public Health, Medicine, Government, Business Administration, and the Department of Economics in the Faculty of Arts and Sciences. Its major purpose is to provide advanced programs in the economics and administration of medical care at both the master's degree and doctoral levels for personnel in the various relevant disciplines.

The Program is intended to equip the student for administrative and policy-making posts in medical care programs or for related teaching and research positions. The Program is planned for several types of students: (1) for those whose needs are met by a master's degree program at the School of Public Health or School of Government, (2) for students who wish to specialize more intensively in medical care during a two year-period, (3) for doctoral candidates under the guidance of any of the participating faculties, and (4) for physicians participating in the residency program in General Preventive Medicine (Health Services Administration) in the School of Public Health.

The Program offers training and research experience in the provision of medical care services and stresses the study and analysis of varying patterns of organization, delivery, and financing of personal health services in the United States and other countries. Students include physicians and other health professionals, economists, social scientists, and management analysts. They are from the various participating schools and departments within Harvard University, and are enrolled as master or doctoral degree candidates in their own schools and departments while taking the Program's basic courses.

A wide range of elective courses is available, in addition to those

HARVARD UNIVERSITY

offered by the School of Public Health, through the various faculties concerned and from the Massachusetts Institute of Technology.

The objective with students enrolled in the School of Public Health is to instruct them in analysis and decision-making and to give them an appreciation of the application of the administrative and social sciences in the operation of medical care programs. For students from other than the School of Public Health, the Program's objective is to provide an adequate understanding of medical care and the special attributes of organized forms of medical care services and to encourage the intelligent application of their own specialties to analysis, planning, evaluation, and research in the field of personal health services.

The Program's research studies provide opportunities for exceptional students to undertake doctoral work and to gain substantial research experience.

For more detailed information on various aspects of the Program, including support for physician residency training, address inquiries to Dr. Alonzo S. Yerby, Professor of Health Services Administration and Director of the Interfaculty Program on Health and Medical Care.

Postdoctoral Fellowship Program in Dental Public Health

The School of Dental Medicine in cooperation with the School of Public Health and the Massachusetts Department of Public Health offers a three-year program of postdoctoral study intended to prepare a limited number of individuals for creative full-time careers in dental public health and ecological dentistry. Each person accepted into the program will be appointed as a Research Fellow in Ecological Dentistry at the School of Dental Medicine.

The first year of the program is spent at the School of Public Health as a candidate for the degree of Master of Public Health. Graduates of other such schools, however, may be accepted into the program with one year advanced standing. The second year involves residency training in cooperation with the Massachusetts Department of Public Health to meet the requirements of the American Board of Dental Public Health. The third year affords opportunity for advanced didactic work and research at the School of Dental Medicine, the School of Public Health and/or other institutions. A research thesis is prepared in this year. A three-year postdoctoral fellowship certificate is awarded upon completion.

The program is designed to meet the needs of the particular student. Academic study beyond the master's level may be arranged in other departments of the University. Residency training involves responsible work with the Massachusetts Department of Public Health at the state or community level. Epidemiological or other research work can be carried on over the entire three-year period in a variety of situations involving either new or continuing studies.

For further information and application forms, write to James M. Dunning, D.D.S., M.P.H., Professor of Ecological Dentistry, Harvard School of Dental Medicine, 188 Longwood Avenue, Boston, Massachusetts, 02115.

Special Courses in Preparation for Careers in Teaching

The role of community-oriented instruction in medical education has, in recent years, been receiving increasing recognition. Major changes are taking place in the teaching of public health and preventive medicine, both in the United States and abroad. The challenge of expanding teaching responsibilities has led to a growing need for qualified teachers of public health, preventive medicine, and preventive dentistry in schools of public health, medicine and dentistry.

The interest of the Harvard School of Public Health in preparing students for academic posts both within the United States and abroad is underscored by the fact that over the past two decades approximately one-fourth of all the alumni have undertaken careers in teaching and research following graduation from the School. In many instances such alumni prepared for their teaching and research careers by completing the program for the degree of Doctor of Public Health or Doctor of Science in Hygiene in their chosen academic specialties. Although the curriculum has emphasized didactic instruction in a particular academic discipline as well as training in research methodology, there has, however, been a need for special courses in teaching methods to supplement the various programs of the twelve departments of the School.

To help meet this need, the Harvard School of Public Health in 1956 began a "Program for Teachers of Preventive Medicine and Public Health." The Program was conducted on an experimental basis until 1961 when it was accepted as a regular component of the academic activities of the School.

The special courses in teaching methods which were developed during 1956-61 have been continued and further modified. Their objectives are to provide an understanding of the educational methods which are most useful in the teaching of various disciplines

represented in schools of public health, and in departments of preventive medicine or social medicine in medical schools. They may be taken as part of a program leading to either a Master of Public Health or Master of Science in Hygiene degree.

The special courses are planned for two categories of individuals:

- (1) for those without previous teaching experience, who are interested in exploring the opportunities of an academic career in one of the disciplines of public health or preventive medicine; and
- (2) for those who now are teaching in departments of preventive medicine or schools of public health and who desire additional knowledge and understanding of the methodology of instruction.

Individuals in the latter category, particularly if they already hold an M.P.H., are encouraged to register as candidates for the Master of Science in Hygiene degree; they may later wish to apply for doctoral candidacy. The flexibility of the curriculum leading to this degree enables the candidate to develop additional competence in a particular specialty (i.e., epidemiology, health services administration, infectious diseases, nutrition, etc.) and at the same time to participate in the seminars and tutorial instruction of the special courses. Of particular relevance to individuals who already hold teaching positions elsewhere is the fact that a one-year leave of absence from their own institution will allow them to complete this type of program. Opportunity is provided to focus not only on the subject area content but also on the teaching process itself. Participation in the special courses is open to physicians and other members of the health professions.

The objectives of the special courses are carried out by supplementing the existing departmental course structure by means of special seminars and tutorial instruction offered by senior members of the Faculty. Guest participants from the Harvard Graduate School of Education and departments of preventive medicine from several medical schools augment the regular Faculty of the Harvard School of Public Health in seminar presentations which are developed in three phases. The first phase is concerned with the

HARVARD UNIVERSITY

orientation of teaching in the field of public health and preventive medicine. The various approaches to teaching in this area are considered in historical and geographical perspective and in relation to the changing goals of education in the health sciences. During the second phase, current aspects of educational theory and practice are discussed in terms of teaching and learning in the setting of schools of medicine, dentistry, and public health. This includes principles of curriculum development, formulation of educational objectives, selection of teaching methods, and forms of evaluation. The third phase of the seminar course deals with the teaching of specific subject areas in public health and social or preventive medicine, such as biostatistics, epidemiology, and provision of health services.

In addition to the special seminar series and a wide choice of electives throughout the University, opportunity for individual tutorial studies is also available. Through tutorials, the student may explore in further depth teaching areas of particular interest to him, obtain experience in curriculum design, observe teaching activities in selected cooperating departments of public health and social or preventive medicine, engage in supervised student teaching, or undertake research in the chosen area of specialization.

Further information on the special courses may be obtained by addressing inquiries to Dr. Ascher J. Segall, Assistant Professor of Epidemiology.

FIVE

GENERAL INFORMATION

Registration

Registration in the School of Public Health for the academic year 1967-68 is held on the following dates:

September 11, Monday, 10 A.M.	Opening session and registration for new International Students
September 13, Wednesday, 2 P.M.	Opening session and registration for new U.S. Students
September 18, Monday, 10 A.M.	Opening session and registration for students enrolled in 1966-67

The period between the opening sessions and September 22 is devoted to conferences with Faculty members, selection of courses of study and orientation lectures. Formal instruction begins on Monday, September 25. All students are required to attend the opening session and to be present for the registration period.

International Students

Students coming to the United States for the first time participate in a program of lectures and discussions during the period from Monday, September 11 to Friday, September 22, 1967. The program is planned to acquaint the students with our customs and teaching methods, with library and other facilities available. It includes lectures and seminars, visits to various University departments and to hospitals or public health activities in Boston.

During this period each student who comes from outside the United States will have a conference with the Associate Dean for International Affairs to discuss his particular needs and interests. The Associate Dean, as well as the staff of the Dean's Office, is available for consultation with students throughout the year.

All students who are not citizens of the United States are referred during the orientation period to the Harvard International Office, Holyoke Center, 75 Mt. Auburn Street, Cambridge, where they show their passports, and fill out a Student Registration form.

Fees and Expenses

The tuition fees for the academic year 1967-68 are listed below. The fee includes the Health Service Fee for medical care and hospital insurance for all resident students. Each candidate for a degree must have a minimum of one year of residence at the School at full tuition.

	<i>Rate</i>
Full-time resident students	\$2,000
Half-time resident students	1,100

All students will pay tuition at the above rates with the following exceptions:

Doctoral candidates or Special Students in the second or later years of a doctoral or special program:

Full-time resident students	\$1,100
Half-time resident students	600
Non-resident doctoral candidates, registered in absentia	350

Part-time Special Students, enrolled for less than half-time:

First credit unit of work	95
Each additional unit per term up to 10 units	47.50

Summer Session—Effective July 1, 1968

Students who register and receive credit for research or supervised study during part or all of the 12-week summer period will pay tuition as follows:

Students who have not completed the residence requirement for a degree; full-time 12 weeks	\$750
Students who have completed the residence requirement for a degree; full-time 12 weeks	375
Students registered for less than 12 weeks or for less than full-time will pay at a proportionate rate	

Payment of Fees

Bills for tuition and fees will be issued and payable as follows:

Issued Payable

At registration	Within 10 days	$\frac{1}{4}$ Tuition
Nov. 30	Dec. 15	$\begin{cases} \frac{1}{4} \text{ Tuition} \\ \text{Board through October 31} \\ \text{Miscellaneous Charges} \end{cases}$
Jan. 30	Feb. 15	$\begin{cases} \frac{1}{4} \text{ Tuition} \\ \text{Board through December 31} \\ \text{Miscellaneous Charges} \end{cases}$
April 30	May 15	$\begin{cases} \frac{1}{4} \text{ Tuition} \\ \text{Board through March 31} \\ \text{Miscellaneous Charges} \end{cases}$
June 5*	June 12	$\begin{cases} \text{Board to the end of the year} \\ \text{Miscellaneous Charges} \end{cases}$
June 30	July 15	$\begin{cases} \text{Board to the end of the year} \\ \text{Miscellaneous Charges} \end{cases}$

Students who are candidates for degrees must have paid all dues to the University at least one day before the day upon which the degrees are to be voted. A student who leaves during the year is charged to the end of the tuition period in which he leaves, provided before that time he gives the Dean notice in writing of his withdrawal; otherwise he is charged to the end of the tuition period in which such notice is given.

* Applies only to candidates for degrees.

HARVARD UNIVERSITY

A student who leaves the University for any reason whatever must pay all charges against him immediately upon receipt of a bill from the Comptroller's Office. Every student is held responsible for the payment of fees until he has notified the Dean of his intention to withdraw from the School.

All term bills are sent to the student at his local address unless the Comptroller's Office is requested in writing to send them elsewhere.

Any student whose indebtedness to the University remains unpaid on the date fixed for payment is deprived of the privileges of the University. Reinstatement is obtained only by consent of the Dean of the School in which the student is enrolled after payment of all indebtedness and a reinstatement fee of \$10. In addition as a condition of reinstatement such student is required to file with the Comptroller a bond in the amount of \$1000 as security for the payment of future term bills.

Field Observation Study Visit

The estimated cost of travel, hotel accommodations, and food for the one-week study period in Puerto Rico (Maternal and Child Health 30e) is \$275. Each student wishing to enroll in the course should assure himself that the necessary funds to cover this expense are available from his fellowship or other sources.

Student Health Service

Under the University Health and Insurance Plan, students at the School of Public Health receive medical care and insurance toward hospital expenses. Medical care is provided through the facilities of the Medical Area Health Service, located in Vanderbilt Hall. The hospitalization insurance extends for a period of twelve months from September 1, and covers hospitalization in Boston and elsewhere. Research and Teaching Fellows who are in a training status are required to enroll in the Student Health Plan unless they can show that they have comparable coverage.

An excellent prepaid program for the care of wives and children of full-time students is available. As the plan provides extensive benefits for ambulatory and inpatient care, all who are eligible are strongly advised to enroll. Its coverage, like that of the Student Plan, extends for a period of twelve months from September 1, and provides full semi-private hospitalization benefits. Information about the plan for dependents is sent to students in advance of registration or may be obtained from the Registrar.

Entrance medical examinations are required of all entering full-time students except for United States Government employees and United States military personnel.

Evidence of successful vaccination against smallpox within three years is required for entrance to Harvard University, and a certification form for this purpose is sent to each student who is accepted for admission.

Any illness necessitating absence from classes should be reported to the Student Health Service Office by the student or an attending physician, and to the Registrar's Office at the School. A physician from the Health Service is on call twenty-four hours a day and can be reached through the switchboard of Harvard University.

In order to realize maximum benefit from the opportunities provided by the academic program of the School, students must be in excellent physical and mental health. Prospective students are urged to undergo a thorough examination to satisfy themselves of their fitness before making arrangements to enter the School.



At the Henry Lee Shattuck International House there are

recreation rooms for children
and for adults.



Housing

The Henry Lee Shattuck International House is the apartment residence maintained by the Harvard School of Public Health for its full-time students and their families. These apartments are comfortably furnished and are leased for the ten month period, September 1st through June 30th. Detailed information and the necessary forms are issued at the time of admission to the School.

Interested students are advised to forward their applications to Mrs. Margaret D. Penrose, Harvard School of Public Health, 55 Shattuck Street, Boston, Mass. 02115. Applications are reviewed during June and all applicants are notified by June 30th.

The children entertain at a Christmas party.



In general, housing in Boston is expensive and adequately furnished apartments are limited. Additional information on housing in the vicinity of the School, other than the Shattuck International House, and in nearby residential areas may be obtained from the Harvard University Housing Office, 1737 Cambridge Street, Cambridge, Mass. 02138. Inquiries may also be addressed to Mrs. Margaret D. Penrose at 55 Shattuck Street, Boston, Mass. 02115. Students writing for information should indicate the size of their family, the number of rooms desired and whether or not they wish furnished or unfurnished accommodations.

Employment

Generally it is not advisable for a student to seek employment as a means of financing his training because the course of study at the School is an intensive, full-time program. If the wife of a student has secretarial or technical skills and wishes to obtain temporary employment, she may consult the Harvard Medical Center Personnel Office in Building A of the Medical School after getting settled in Boston. Wives of foreign students who wish to work in Boston must indicate this fact when obtaining their visas for the United States.

Fellowships and Traineeships

The fellowships and traineeships described below were available to students for the academic year 1967-68. It is expected that comparable awards will be available for 1968-69.

Applications for fellowships and traineeships should be made to: The Registrar, Harvard School of Public Health, 55 Shattuck Street, Boston, Massachusetts 02115. Applications should be received by April 1, 1968 for awards for the academic year 1968-69. Under exceptional circumstances awards may be considered at other times.

Fellowships and Traineeships Awarded by the School

Fellowships and traineeships are available from grants to the School for students who are candidates for master's or doctor's degrees. They include a monthly stipend plus tuition. Applicants for awards from Public Health Service or Children's Bureau grants must be citizens of the United States or have been lawfully admitted to the United States for permanent residence.

1. Public Health Service General Purpose Traineeship Grant (Title I) for physicians, dentists, veterinarians, nutritionists, medical social workers, health educators and others whose professional skills are required in modern public health practice.

2. Public Health Service Title II traineeships for public health nurses.

3. Traineeships from Public Health Service Training Grants to Departments of the School are available for study at the pre-doctoral or post-doctoral levels in the following fields:

Biostatistics.

Environmental Health (including occupational medicine, radiological health and air pollution).

Industrial Hygiene.

Physiology (including toxicology).

Epidemiology; for candidates with degree of M.D. or Ph.D. or equivalent.

Microbiology; for candidates with degree of M.D. or Ph.D. who wish to specialize in the field of infectious diseases, including rickettsial, viral, bacterial and mycological infections.

Nutrition.

Health Services Administration; Public Health Service Special Purpose Traineeship Grant for training in the economics and administration of medical care at the master's level. Traineeships from Public Health Service Training Grant for research training in medical care and health education at the doctoral level.

Tropical Public Health; for training in medical parasitology, in tropical medicine and in tropical public health.

4. Fellowships provided by a grant from the Children's Bureau

HARVARD UNIVERSITY

are available for students who intend to specialize in Maternal and Child Health.

5. Fellowships provided by a training grant from the National Aeronautics and Space Administration are available for students who intend to specialize in aerospace health and safety.

Fellowships Awarded Outside the School

Fellowships are available in Industrial Medicine and Health Physics from the Atomic Energy Commission. Applicants for fellowships in Industrial Medicine (physicians only) should write to: A.E.C. Fellowships in Industrial Medicine, Atomic Energy Project, University of Rochester, School of Medicine and Dentistry, Rochester 20, New York. Applicants for fellowships in Health Physics should write to: Fellowship Office, Oak Ridge Institute of Nuclear Studies, Oak Ridge, Tennessee.

Fellowships and Scholarships Available in Other Departments of the University as well as in the School of Public Health

There are a few General University Scholarships and Fellowships which, under the terms of the original gift to the University, may be awarded to students in any part of the University, including the School of Public Health. Many of these are for persons from a particular city, state or country, for study of a particular field, or for those with other special qualifications. Applications for these scholarships must be received at the School of Public Health by February 1, 1968. A pamphlet describing these University Scholarships may be obtained from the Registrar's Office of the School of Public Health.

Students 1966-67

Degree Candidates and Full-Time Special Students

Byron B. Alexander, A.B., S.B., M.D.	Las Cruces, New Mexico
Myron Allukian, Jr., S.B., D.D.S.	Newton Center, Massachusetts
Yasin Balbaky, A.B., M.D.	Damascus, Syria
Nicholas E. Barreca, S.B., M.D.	Long Island City, New York
Frederic Bass, S.B., M.D., S.M. IN HYG.	Duxbury, Massachusetts
William F. Belk, A.B., S.B., M.D.	Grand Forks, North Dakota
Robert C. Benfari, A.B., PH.D.	New York, New York
Robert B. Berg, A.B., M.D.	Newton, Massachusetts
Warren L. Berggren, M.D., M.P.H., DR. P.H.	Aurora, Nebraska
Madeleine Blanchet-Patry, A.B., M.D.	Montreal, Canada
Andrew G. Braun, A.B., S.B., S.M. IN HYG.	Brookline, Massachusetts
Ann M. Briley, S.B., M.D.	Cape Neddick, Maine
Julie E. Brown, S.B.	Waban, Massachusetts
Charles R. Buncher, S.B., S.M. IN HYG.	Millburn, New Jersey
Jane C. Caceres-Baltazar, M.D., M.P.H.	Manila, Philippines
Albert Cierebiej, A.B., M.D.	Pulaski, Pennsylvania
Helen P. Cleary, A.B., M.P.H.	Norfolk, Massachusetts
Ellen R. Cohen, S.B.	Waltham, Massachusetts
Philip T. Cole, A.B., M.D.	Brighton, Massachusetts
Roger R. Connelly, S.B., S.M., IN HYG. (in absentia)	Mason City, Iowa
Alan J. Cooper, A.B., M.D.	Seattle, Washington
Robert L. Craig, A.B., M.D., C.M.	Jacksonville, Vermont
Donald A. Creasia, A.B.	Brighton, Massachusetts
Allen L. Cudworth, S.B., S.M.	Needham, Massachusetts
Fritz Daguillard, B.A., M.D., M.P.H.	Cayes, Haiti
Michael A. Davis, S.B., S.M., S.M. IN HYG.	Quincy, Massachusetts
Stanley V. Dawson, S.B., S.M.	Boston, Massachusetts
Louis E. Dickinson, A.B., M.D.	McCook, Nebraska
John D. Dougherty, A.B., M.D., M.P.H.	Boston, Massachusetts
Johanna T. Dwyer, S.B., S.M., S.M. IN HYG.	Syracuse, New York
Jacqueline H. Fabia, M.D., S.M. IN HYG.	Paris, France
Helen E. Fillmore, S.B., S.M.	Revere, Massachusetts
Edvard Fjaerstoft, M.D.	Bergen, Norway
Dorothy J. Ganick, A.B.	Brookline, Massachusetts
Antoine Gattreau, M.D., F.R.C.P.	Montreal, Canada
Hanna Gelband, S.B.	New York, New York

HARVARD UNIVERSITY

Hossein Ghassemi, DR. OF PHARMACY, S.M.,	Teheran, Iran
M.P.H.	
Ronald Gold, A.B., M.D.	Cambridge, Massachusetts
Judith D. Goldberg, A.B.	New York, New York
Michael D. Goldman, A.B., M.D.	Sturgeon Bay, Wisconsin
Donald E. Goldstone, A.B., M.D. M.P.H.	Baltimore, Maryland
David Goodman, A.B., S.B., M.D.	Quincy, Massachusetts
Jean K. Gray, M.D., C.M.	Jamaica, West Indies
Peter Greenwald, A.B., M.D.	Brookline, Massachusetts
Rodrigo Guerrero, M.D., S.M. IN HYG.	Cali, Colombia
Virginia R. Hannon, A.B., A.M., M.S.W., S.M. IN HYG.	Atlanta, Georgia
Nancy W. Hendrie, A.B., M.D.	Concord, Massachusetts
Marion E. Highriter, A.B., M.N., M.P.H.	Wilkes-Barre, Pennsylvania
Tomio Hirohata, M.D., S.M. IN HYG. (in absentia)	Fukuoka City, Japan
Frederick C. Hoesly, S.B., S.M., M.D.	Milwaukie, Oregon
Alice M. Hosack, S.B., A.M., S.M. IN HYG.	Boston, Massachusetts
Jong Huh, M.D., M.S.C., M.P.H., DR. PHIL.	Seoul, Korea
Dwight T. Janerich, S.B., D.D.S.	Wilkes-Barre, Pennsylvania
Andrew G. Jessiman, B.A., M.A., M.B.B.CH., F.R.C.S., F.A.C.S.	Chestnut Hill, Massachusetts
Louis F. Johnson, Jr., S.B., M.D., M.P.H. (in absentia)	Los Angeles, California
David W. Johnston, B.D.S.	Belfast, Ireland
Charles T. Kaelber, A.B., S.B., M.D.	Marion, Ohio
Edward F. Kastelic, S.B., D.D.S.	Milwaukee, Wisconsin
A. Kay Keiser, S.B., M.P.H.	Kulpmont, Pennsylvania
Ralph L. Kent, Jr., A.B.	Milton, Massachusetts
Irving I. Kessler, A.B., A.M., M.D., M.P.H. (in absentia)	Baltimore, Maryland
David R. Kinloch, M.D., D.P.H.	Liverpool, New York
Leonard R. Kowalski, S.B., M.D.	Needham, Massachusetts
Leon E. Kruger, S.B., M.D.	Newton Center, Massachusetts
Hsien C. Kuo, B.M.D.	Taiwan, Formosa
Robert R. Lauwers, M.D., M.I.H., S.M. IN HYG.	Bertem Brabant, Belgium
Robert K. Leet, A.B., M.D., M.P.H.	Worcester, Massachusetts
Yuling Li, A.B.	Boston, Massachusetts
Barbara N. Lieb, A.B.	Maplewood, New Jersey
Noel D. List, A.B., M.D.	Watertown, Massachusetts
Robert D. Lynch, A.B., S.M. IN HYG.	Medford, Massachusetts
Leslie N. H. MacLeod, S.B., M.P.H.	Arlington, Massachusetts

SCHOOL OF PUBLIC HEALTH

James O. Mason, A.B., M.D., M.P.H. (in absentia)	Decatur, Georgia
George W. Mathews, Jr., S.B., M.D.	Augusta, Georgia
Arthur H. McIntosh, A.B., M.S.A., S.M., S.M. IN HYG.	Jamaica Plain, Massachusetts
Edward N. McIntosh, S.B., M.D.	David City, Nebraska
Phyllis B. Michelsen, A.B., S.M.	Wareham, Massachusetts
Ralph E. Miller, A.B., M.D., S.M. IN HYG.	Hanover, New Hampshire
Richard N. Miller, M.D.	Hampshire, Illinois
Richard R. Monson, S.B., M.D.	Moorhead, Minnesota
Margot L. Morris, B.A.	Oshawa, Ontario, Canada
Debhanom Muangman, A.B., M.D., M.P.H.	Bangkok, Thailand
Gretel S. Munroe, A.B., A.M.	New York, New York
Raymond L. H. Murphy, Jr., S.B., M.D., M.P.H.	Flushing, New York
Lechaim Naggan, B.MED.SCI., M.D., M.P.H.	Herzlia, Israel
Charles Neave, A.B., M.D., M.P.H.	Wellesley, Massachusetts
Raymond K. Neff, A.B.	Manhasset, New York
David M. Nitzberg, A.B., S.M., S.M. IN HYG., S.D. IN HYG.	Lexington, Massachusetts
Donald P. O'Donoghue, A.B., M.D.	Portland, Oregon
Rudolph L. Ozere, B.S.C., M.D.	Halifax, Canada
Jonathan B. Pasternack, A.B., M.D.	Newton Center, Massachusetts
Maria E. Perea, M.D.	Brookline, Massachusetts
Carl J. Pfeiffer, A.B., A.M., PH.D.	San Jose, California
Rita F. Pope, S.B., S.M.	Wellesley, Massachusetts
Siegfried M. Pueschel, M.D.	Montreal, Canada
Celso M. Pugliese, M.D., M.P.H.	Salvador, Bahia, Brazil
Adolf E. Rahm, Jr., A.B., M.D.	Fairborn, Ohio
Janet C. Register, A.B., M.D.	Brookline, Massachusetts
Edith H. Reinisch, S.M.	Holyoke, Massachusetts
Charles W. Roach, A.B., M.S.W.	Mangum, Oklahoma
Edward J. Rolde, A.B., M.D.	Boston, Massachusetts
Nancy L. Role, A.B.	Milton, Massachusetts
Harold P. Roth, A.B., M.D.	Chagrin Falls, Ohio
Thora J. Runyan, S.B.	Ukiah, California
William S. Runyan, S.B., S.M.	Ukiah, California
Raymond Russo, M.D.V., S.M.	Kingston, Massachusetts
Gerald A. Ryan, M.B., B.S., M.D.	Adelaide, Australia
Richard M. Ryan, Jr., A.B., M.S.S.S.	Dorchester, Massachusetts
David L. Sackett, A.B., M.D.	Buffalo, New York
Amin K. Said, M.B., B.CH., M.P.H., D.P.H., S.M.	Cairo, Egypt
Aida H. Salcedo, D.D.M.	Manila, Philippines

HARVARD UNIVERSITY

Vitura Sangsingkeo, M.D., M.P.H.	Bangkok, Thailand
Roberta A. Savitz, A.B., M.D.	Brookline, Massachusetts
George B. Schreiber, S.B.	West Hempstead, New York
John Schulman, Jr., S.B. M.D.	Waban, Massachusetts
Gajindar Sethi, A.B., B.S.C. ENG.	Bombay, India
Reinhard Sidor, A.B.	Ayer, Massachusetts
Alvin J. Simmons, PH.D., S.M. IN HYG. (in absentia)	South Dartmouth, Massachusetts
Jeannette J. Simmons, S.B., M.P.H.	Studio City, California
Simon J. Simonian, M.B.B.S., B.A.	Boston, Massachusetts
Pricha Singharaj, M.D.	Bangkok, Thailand
John C. Slocumb, A.B., M.D.	Rochester, New York
Judith S. Stern, S.B., S.M. IN HYG.	Bethesda, Maryland
Joseph B. Stevens, S.B., M.D.	Wildwood Crest, New Jersey
Julian M. Strauss, S.B., M.D.V.	Amenia, New York
Nergesh R. Surti, M.B.B.S.	Bombay, India
Victor O. Tantengco, M.D.	Manila, Philippines
Anthony N. Tse, B.S., S.M., S.M.	Cambridge, Massachusetts
Dwight A. Underhill, B.E., S.M. IN HYG.	Cumberland, Rhode Island
Willem F. Van Ganse, M.D., M.P.H.	Ghent, Belgium
Willem Van Pelt, M.D.	Needham, Massachusetts
Maria C. Vera, S.B., M.D., M.P.H.	Santiago, Chile
Anton F. Vierling, S.B., S.M., S.M. IN HYG. (in absentia)	Westport, Connecticut
Joseph K. Wagoner, S.B., S.M.	Rochester, Minnesota
Eileen P. Walkavich, A.B.	Worcester, Massachusetts
James H. Warram, S.B., M.D., S.M. IN HYG.	Oklahoma City, Oklahoma
Jonathan B. Weisbuch, S.B., M.D.	Washington, D.C.
David E. White, Jr., S.B.	Philadelphia, Pennsylvania
Ronald E. Wyzga, A.B., S.M.	New Bedford, Massachusetts
Kenneth W. Zamkoff, A.B.	Brooklyn, New York

Part-Time Special Students

Norman B. Abell, A.B., M.D.
Dennis P. Berk, A.B., M.D.
Paul F. De Paola, A.B., D.D.S., M.D.S.
James E. Dill, M.D.
Albert J. Kazis, D.M.D.
Geneva B. Kehr, A.B., A.M., ED.D.
Sidney Levin, S.B.
Edward C. Maloof, D.M.D., M.P.H.
Gerald S. Parker, S.B., S.M., S.M. IN HYG.

Newton Center, Massachusetts
Milwaukee, Wisconsin
Arlington, Massachusetts
Vienna, Virginia
Newton, Massachusetts
Brookfield, Connecticut
Newton, Massachusetts
Newton, Massachusetts
Brookline, Massachusetts

SCHOOL OF PUBLIC HEALTH

Jerome H. Smith, S.B., S.M., M.D.
Hope H. Snider, A.B., M.D., M.P.H.

Omaha, Nebraska
Cambridge, Massachusetts

SUMMARY

Candidates for the degree of Master of Public Health	48
Candidates for the degree of Master of Science in Hygiene	44
Candidates for the degree of Doctor of Public Health	9
Candidates for the degree of Doctor of Science in Hygiene	32
Full-time Special Students	7
Part-time Special Students	<u>11</u>
	151

GEOGRAPHICAL ORIGINS OF STUDENTS

United States	120
Canada	5
Central and South America	5
Europe	5
Middle East	4
Far East	<u>11</u>
Australia	<u>1</u>
	151

Degrees

On June 16, 1966, the following degrees were conferred:

DOCTOR OF PUBLIC HEALTH

Manning Feinleib, A.B. (*Cornell Univ.*) 1956; M.D. (*State Univ. of New York—Down State Medical Center*) 1961; M.P.H. (*Harvard Univ.*) 1963.
Thesis: Artificial Menopause and Breast Cancer. A Retrospective Cohort Study
Special Fields: Epidemiology and Biostatistics

DOCTOR OF SCIENCE IN HYGIENE

Joseph David Brain, A.B. (*Taylor Univ.*) 1961; S.M. (*Harvard Univ.*) 1962; S.M. IN HYG. (*ibid.*) 1963.
Thesis: Clearance of Particles from the Lungs: Alveolar Macrophages and Mucus Transport
Special Field: Physiology
Edward James Burger, B.Sc. (*McGill Univ., Canada*) 1954; M.D.C.M. (*ibid.*) 1958; M.I.H. (*Harvard Univ.*) 1960.
Thesis: Oxygen Toxicity and Respiratory Mechanics
Special Field: Physiology
John Milton Peters, S.B. (*Univ. of Utah*) 1957; M.D. (*ibid.*) 1960; M.P.H. (*Harvard Univ.*) 1964.
Thesis: Smoking and Health at Radcliffe and Harvard Colleges
Special Field: Environmental Health
Elizabeth Law Watkins, A.B. (*Bryn Mawr Coll.*) 1944; M.S.S.A. (*Western Reserve Univ.*) 1950; S.M. IN HYG. (*Harvard Univ.*) 1958.
Thesis: The Decision by Negro Mothers to Seek Prenatal Care
Special Field: Maternal and Child Health
John Daniel Yoder, S.B. (*Pennsylvania State Univ.*) 1952; S.M. IN HYG. (*Harvard Univ.*) 1954.
Thesis: Influence of Turbulence on Aerosol Agglomeration and Deposition
Special Field: Environmental Health

MASTER OF PUBLIC HEALTH

Godfrey Douglas Adamson, S.B. (*Univ. of Kentucky*) 1953; M.D. (*Vanderbilt Univ.*) 1957.
Richard Coleman Brown, A.B. (*Univ. of Richmond*) 1958; M.D. (*Univ. of Virginia*) 1963.

SCHOOL OF PUBLIC HEALTH

Max Joseph Bulian, S.B. (*Tufts Univ.*) 1943; M.D. (*ibid.*) 1946.

Myrtle Ursula Caton, A.B. (*Atlantic Union Coll.*) 1957; M.D. (*Loma Linda Univ.*) 1961.

Siew Tin Chen, M.B., B.S. (*Univ. of Malaya, Singapore*) 1960.

Alfred K. Cheng, S.B. (*Washburn Univ.*) 1954; M.D. (*Kansas City*) 1958.

George Peter Contis, A.B. (*Univ. of Pittsburgh*) 1954; M.D. (*George Washington Univ.*) 1958.

Babalola Ayoola Dada, M.D. (*Univ. of Heidelberg, Germany*) 1963.

John Robert Davy, A.B. (*Yale Univ.*) 1954; M.D. (*Temple Univ.*) 1958.

Selma R. Deitch, S.B. (*Tufts Univ.*) 1944; M.D. (*ibid.*) 1949.

Shashi Dhiroo Desai, M.B., B.S. (*Univ. of Bombay, India*) 1961.

Halmond Charles Dyer, M.B., B.S. (*Univ. Coll. of the West Indies, Jamaica*) 1957.

John Howard Fahrni, S.B. (*South Dakota State Coll.*) 1959; M.D. (*Univ. of Iowa*) 1963.

Stephen James Garza, D.D.S. (*Univ. of Texas*) 1957.

Robert Frank Gloor, A.B. (*Atlantic Union Coll.*) 1950; M.D. (*Loma Linda Univ.*) 1954.

Donald Edward Goldstone, A.B. (*Johns Hopkins Univ.*) 1957; M.D. (*Univ. of Chicago*) 1961.

Marise Suss Gottlieb, A.B. (*Barnard College*) 1958; M.D. (*New York Univ.*) 1962.

Ronald Stephen Green, M.D. (*Loyola Medical School*) 1962.

Vincent Florence Guinee, S.B. (*Fordham Univ.*) 1955; M.D. (*Cornell Univ.*) 1959.

Virginia Balderrama Guzman, M.D. (*Univ. of the Philippines, Philippines*) 1951.

Alan Campbell Harter, A.B. (*Williams Coll.*) 1949; M.D. (*Univ. of Buffalo*) 1955.

Elmer Raymond Hermann, S.B. (*Univ. of Wisconsin*) 1956; M.D. (*ibid.*) 1959.

Clarence Archibald Jernigan, A.B. (*Oklahoma Baptist Univ.*) 1956; M.D. (*Baylor Univ.*) 1960.

Leonard William Johnson, S.B. (*Howard Univ.*) 1951; M.D. (*ibid.*) 1956.

Anthony Jong, S.B. (*City College of New York*) 1960; D.D.S. (*New York Univ.*) 1964.

Claude Andre Lanctot, M.D.C.M. (*McGill Univ., Canada*) 1957.

Robert Kline Leet, A.B. (*Harvard Univ.*) 1957; M.D. (*Albany Medical Coll.*) 1963.

Gary Sell Leske, D.D.S. (*Creighton Univ.*) 1962.

David Joseph Lieberman, M.D. (*Jefferson Medical Coll.*) 1950.

Eric Everett Lindstrom, S.B. (*Wheaton Coll.*) 1958; M.D. (*Univ. of Maryland*) 1963.

HARVARD UNIVERSITY

William James MacPherson, B.Sc. (*Dalhousie Univ., Canada*) 1953; M.D., C.M. (*McGill Univ., Canada*) 1958.

William Morley Moore, A.B. (*Williams Coll.*) 1958; M.D. (*Queen's Univ., Canada*) 1962.

Lechaim Naggan, M.D. (*Hebrew Univ., Jerusalem*) 1960.

Niles Lee Perkins, A.B. (*Bowdoin Coll.*) 1946; M.D. (*Tufts Coll.*) 1950.

Ann Hallman Pettigrew, A.B. (*Radcliffe Coll.*) 1956; M.D. (*Boston Univ.*) 1960.

Celso Mario de Araujo Pugliese, M.D. (*Univ. of Bahia, Brazil*) 1958.

Elihu Daniel Richter, A.B. (*Columbia Univ.*) 1959; M.D. (*New York Univ.*) 1963.

Richard Henry Seder, A.B. (*Harvard Univ.*) 1960; M.D. (*ibid.*) 1965.

Sister Anne Sharratt, M.B., B.C.H., B.A.O. (*National Univ. of Ireland*) 1959.

Daniel Harry Spoor, A.B. (*Univ. of Texas*) 1954; M.D. (*ibid.*) 1958.

Doris Harrell Thompson, S.B. (*Louisiana State Univ.*) 1951; M.D. (*Univ. of Michigan*) 1958.

Guthrie Lewis Turner, S.B. (*Shaw Univ.*) 1949; M.D. (*Howard Univ.*) 1953.

Maria Cristina Vera Vidal, B.A.C.H. B. (*Univ. of Chile, Chile*) 1956; M.D. (*ibid.*) 1964.

Dorothy Wilson, M.D. (*Univ. of Panama, Panama*) 1955.

John Jacob Witte, A.B. (*Hope College*) 1954; M.D. (*Johns Hopkins Univ.*) 1959.

Dorothy Jane Worth, M.D. (*St. Louis Univ.*) 1956.

Stella B. Yen, M.D. (*Univ. of Santo Tomas, Philippines*) 1954.

Samuel Antes Youngman, S.B. (*Franklin & Marshall Coll.*) 1946; M.D. (*Univ. of Pennsylvania*) 1949.

MASTER OF SCIENCE IN HYGIENE (in the field of Biostatistics)

James Heber Warram, S.B. (*Univ. of Oklahoma*) 1957; M.D. (*Harvard Univ.*) 1961.

(in the field of Demography and Human Ecology)

Jean-Marc Fredette, M.D. (*Laval Univ., Canada*) 1960; D.P.H. (*Univ. of Montreal, Canada*) 1962.

Rodrigo Cierrezero, M.D. (*Universidad del Valle, Colombia*) 1962.

(in the field of Epidemiology)

Frederic Bass, S.B. (*Antioch Coll.*) 1955; M.D. (*Western Reserve Univ.*) 1959.

John Wynford Davies, M.B., B.S. (*Univ. of London, England*) 1950; D.P.H. (*Univ. of Toronto, Canada*) 1956.

Jacqueline Jean Fabia, M.D. (*Faculty of Medicine, Lille, France*) 1944.

SCHOOL OF PUBLIC HEALTH

(in the field of Infectious Diseases)

William Paul Reagan, A.B. (*Yale Univ.*) 1951; M.D. (*Johns Hopkins Univ.*) 1955.

(in the field of Maternal and Child Health)

Gretchen Mary Glodé Berggren, A.B. (*Nebraska State Coll.*) 1954; M.D. (*Univ. of Nebraska College of Medicine*) 1958.

Yuan Ping Chen, M.D. (*National Taiwan Univ., China*) 1951.

(in the field of Microbiology)

Arthur Herbert McIntosh, A.B. (*McMaster Univ., Canada*) 1959; M.S.A. (*Guelph Agr. Coll., Canada*) 1962; S.M. (*Massachusetts Institute of Technology*) 1965.

(in the field of Nutrition)

Robert Denis Lynch, A.B. (*Northeastern Univ.*) 1964.

Judith Ann Mabel, S.B. (*Cornell Univ.*) 1964.

Judith Schneider Stern, S.B. (*Cornell Univ.*) 1964.

(in the field of Occupational Medicine)

Adolph Joseph Brink, A.B. (*Univ. of Buffalo*) 1958; M.D. (*ibid.*) 1962; M.P.H. (*Harvard Univ.*) 1965.

Lionel Melvin Lieberman, A.B. (*Univ. of Virginia*) 1948; M.D. (*ibid.*) 1952; M.I.H. (*Harvard Univ.*) 1965.

(in the field of Public Health Practice)

Paul Chieh Yee Chen, M.B.,B.S. (*Univ. of Malaya, Singapore*) 1960; M.P.H. (*Harvard Univ.*) 1965.

Shirley Ann Nelson, A.B. (*Univ. of Nebraska*) 1951; M.S.W. (*ibid.*) 1954.

James Elliot Cabot Walker, A.B. (*Williams Coll.*) 1949; M.D. (*Univ. of Pennsylvania*) 1953.

Charles Tate Wilson, A.B. (*Mercer Univ.*) 1959; M.S.W. (*Florida State Univ.*) 1961.

(in the field of Radiological Health)

Melva Viloria Vives, B.S.,CH.E. (*Univ. of Santo Tomas, Philippines*) 1961.

(in the field of Toxicology)

Robert Rodolphe Lauwers, M.D. (*Univ. of Louvain, Belgium*) 1962; M.I.H. (*ibid.*) 1965.

(in the field of Tropical Public Health)

Fergus Samuel McCullough, B.Sc. (*The Queen's University of Belfast, Ireland*) 1948; M.Sc. (*ibid.*) 1951; Ph.D. (*ibid.*) 1956.

HARVARD UNIVERSITY

On March 6, 1967 the following degrees were conferred:

DOCTOR OF PUBLIC HEALTH

Warren Lee Berggren, M.D. (*Nebraska Univ.*) 1955, M.P.H. (*Harvard Univ.*) 1963.

Thesis: The Immunoelectrophoretic Demonstration of Circulating Antigen in Mice and Hamsters Heavily Infected with *Schistosoma Mansoni*

Special Field: Tropical Public Health

DOCTOR OF SCIENCE IN HYGIENE

William Roger Jobin, S.B. (*Massachusetts Institute of Technology*) 1959, S.M. (*ibid.*) 1961, S.M. IN HYG. (*Harvard Univ.*) 1964.

Thesis: The Operation of Reservoirs for Control of Aquatic Snails
Special Field: Tropical Public Health

David Morris Nitzberg, A.B. (*Columbia Univ.*) 1956, S.M. (*Ohio State Univ.*) 1957, S.M. IN HYG. (*Harvard Univ.*) 1963.

Thesis: The Methodology of Record Linkage
Special Field: Biostatistics

MASTER OF PUBLIC HEALTH

Hossein Ghassemi, PH.D. (*Univ. of Teheran, Iran*) 1957, S.M. (*Univ. of Wisconsin*) 1960.

Vitura Sangsingkeo, M.D. (*Siriraj Medical School, Thailand*) 1961.

MASTER OF SCIENCE IN HYGIENE

(in the field of Microbiology)

Edward Naim Kassira, M.B.,CH.B. (*Univ. of Baghdad*) 1959, M.P.H. (*Johns Hopkins Univ.*) 1965.

Index

Officers of Administration, Instruction and Research

Abelin, T. 19, 71
Alpert, J. J. 122
Amdur, M. O. 17, 87
Antoniades, H. N. 19, 126
Armstrong, R. A. 30, 132
Augustine, D. L. 33
Austin, J. M. 22, 83

Baile, C. A. 26, 126
Bajema, C. J. 28, 138
Barnaby, M. G. 13, 22
Beiser, M. 19, 132
Bell, S. D., Jr. 17, 94
Benfari, R. C. 28, 132
Bennett, G. F. 11
Berenberg, W. 122
Berg, R. B. 122
Berggren, G. M. 28, 138, 141
Berggren, W. L. 19, 104
Berliner, M. D. 28, 95
Bernstein, D. S. 127
Berry, C. A. 22, 87
Berry, R. E. 114
Bianco, J. A. 31, 127
Bishop, Y. M. 19, 65
Boutourline-Young, H. J. 27, 132
Bowie, E. J. 33, 127
Brain, J. D. 28, 88
Brandt, A. D. 22, 83
Bruni, C. 28, 126
Bruno, D. 33, 127
Burden, R. P. 13, 91, 154
Burger, E. J. 28, 87
Burgess, W. A. 20, 83
Burke, B. S. 33
Burr, F. H. 11
Butler, R. M. 28, 121
Buxbaum, R. C. 115

Campbell, C. C. 17, 94, 104
Cardoza, V. G. 31, 132
Cares, J. W. 33, 84
Chang, R. S. 17, 94
Chernin, E. 17, 104
Claff, W. L. 13, 17, 87
Coatney, G. R. 22, 104
Cohn, H. D. 26, 121
Connelly, A. P. 28, 132
Cooke, L. S. 23, 83
Costin, C. D. 33, 121
Cowin, R. 26, 121
Cox, H. R. 23, 94
Croog, S. H. 17, 132
Crowley, T. J. 28, 88
Curran, W. J. 15, 113

Daggy, R. H. 12, 14, 17, 104, 153
Dammin, G. J. 105
Dane, J. K. 23, 83
Danley, R. A. 27, 132
Davies, A. M. 30, 71
Demian, E. S. 31, 105
Dennis, R. 20, 83
Densen, P. M. 23, 65
Drinker, P. 33
Dorfman, R. 138
Drolette, M. E. 20, 65
Dunlop, J. T. 114
Dunning, J. M. 114, 157
Dyck, A. J. 138

Edsall, G. 15, 94
Efron, B. 65
Ekdahl, M. C. 33, 121
Eliot, M. M. 34
Elkins, H. B. 23, 87
England, R. A. 31, 127

HARVARD UNIVERSITY

Esterquest, R. T.	13, 22, 42	Heimann, H.	27, 87
Fair, G. M.	34	Hendricks, N. V.	24, 84
Farnsworth, D. L.	15	Herrera-Acena, M. G.	20, 126
Fassett, D. W.	23, 87	Hood, W. B., Jr.	29, 126
Feeney, J. J.	13, 22	Hoppin, F. G.	31, 88
Feinleib, M.	20, 71	Hunt, R. D.	127
Feldman, J. J.	18, 65, 118	Hutchison, G. B.	24, 71
Feldstein, M. S.	115	Iltis, W. G.	32, 105
Fendall, N. R. E.	23, 104	Jacobs, A. R.	20, 113
Ferris, B. G., Jr.	18, 87	Janeway, C. A.	121
Fiering, M. B.	91	Kane, R. K.	11
Finucane, K. E.	31, 88	Kasten, J.	24, 113
First, M. W.	18, 83	Kawashima, K.	32, 105
Forbes, W. H.	18, 87	Kelty, M. F.	32, 127
Forsyth, J. H.	28, 126	Kennedy, S.	11
Fortin, J. N.	31, 132	Kirkwood, S. B.	24, 104
Fraser, C. E. O.	29, 95	Knudson, R. J.	32, 88
Frechette, A. L.	15, 113	Koch-Weser, D.	18, 104, 141
Frisch, R. E.	29, 138	Kovar, E. B.	24, 113
Frothingham, T. E.	18, 104, 154	Kundsin, R. B.	95
Fujimoto, G. I.	23, 138	laRivière, W. M.	91
Gerarde, H. W.	23, 83	Laskey, B. J.	13
Germani, G.	138	Latham, M. C.	20, 126
Gershoff, S. N.	18, 126	Leavell, H. R.	34
Geyer, R. P.	18, 126	Lee, S. S.	115
Gezon, H. M.	23, 94	Leibenstein, H.	138
Gideon, H.	27, 139, 141	Leighton, A. H.	14, 15, 132
Gilbertson, D. E.	31, 105	Leith, D. E.	20, 87
Girard, K. F.	29, 95	Lesser, A. J.	24, 121
Glass, R. L.	71	Levey, S.	24, 113
Glick, Z.	31, 127	Levine, L.	33, 95
Gold, R.	31, 105	Lewinshon, G.	32, 88
Goldmann, F.	34	Ley, H. L., Jr.	18, 71, 94
Gorbach, I. E.	26, 121	Lindqvist, K. J.	32, 95
Gordon, J. E.	34	Lisco, H.	71
Gore, I.	127	Little, J. B.	20, 87
Gottlieb, M. S.	71	Lorian, V.	29, 95
Green, I. D.	31, 88	Lown, B.	18, 126
Greep, R. O.	15, 138, 141	Ludwig, J. H.	24, 84
Guerrero, R.	27, 141	MacCready, R. A.	18, 94
Hamilton, A.	34	MacMahon, B.	14, 16, 71
Harding, J. S.	31, 132	Madoff, M. A.	24, 94
Hardy, H. L.	84	Mahoney, A. W.	32, 127
Harrington, J. J.	20, 91		
Heer, D. M.	20, 65, 141		
Hegsted, D. M.	15, 126		

SCHOOL OF PUBLIC HEALTH

Mahoney, J. R. 20, 83
 Marbury, W. L. 11
 Mayer, J. 16, 41, 126, 153
 McCann, M. B. 29, 126
 McCarthy, G. 32, 119
 McComb, D. E. 33, 95
 McCombs, H. L. 29, 126
 McFarland, R. A. 16, 87
 McGandy, R. B. 20, 126
 McKay, E. B. 31, 132
 McLaughlin, C. P. 115
 Mead, J. 16, 87
 Michelson, E. H. 20, 104
 Miettinen, O. S. 20, 65, 71
 Miller, J. M. 29, 126
 Miller, L. 29, 121
 Miller, R. W. 25, 71
 Mitchell, R. 91
 Moeller, D. W. 18, 76, 83
 Monroe, R. G. 88
 Moore, R. C. 27, 87
 Morris, J. C. 91
 Most, H. 25, 104
 Mott, B. J. F. 21, 113
 Muench, H. 34
 Murphy, J. M. 21, 132, 153
 Murphy, S. D. 18, 87
 Murray, E. S. 16, 94, 153
 Myers, M. L. 26, 126
 Nangeroni, A. L. 29, 132
 Neave, C. 29, 139, 141
 Neva, F. A. 16, 104
 New, M. L. 29, 65
 Nichols, R. L. 21, 94
 Nickerson, A. L. 11
 O'Connell, D. J. 31, 132
 O'Connor, J. D. 33, 95
 Oviatt, C. A. 30, 84
 Paffenbarger, R. S., Jr. 25, 71
 Pan, S. C. 21, 104
 Pennell, R. B. 25, 94
 Penrose, M. D. 13, 169
 Pensinger, R. R. 28, 126
 Peters, J. H. 21, 94
 Peters, J. M. 21, 87, 153
 Peterson, O. L. 114
 Phillips, H. T. 25, 113
 Pickett, R. M. 21, 87
 Plank, S. J. 21, 141, 153
 Potter, R. B., Jr. 138
 Pugh, T. F. 19, 71
 Pusey, N. M. 11, 12, 14, 63
 Rammelkamp, C. H. 25, 94
 Reca, M. E. 30, 95
 Reed, R. B. 14, 16, 65
 Reid, D. E. 122
 Reist, P. C. 21, 83
 Remmell, P. S. 26, 126
 Renthal, A. G. 26, 113
 Reshef, A. 32, 127
 Revelle, R. 12, 16, 138, 141
 Rice, E. P. 34
 Roca-Garcia, M. 28, 94
 Rogers, P. P. 30, 139
 Sabo, D. J. 32, 127
 Sachs, B. 26, 121
 Saffran, M. 25, 138
 Safilios-Rothschild, C. 30, 139
 Salber, E. J. 122
 Salhanick, H. A. 16, 138, 141
 Salmon, M. C. 13, 14
 Scharrer, E. 32, 127
 Schmidt, W. M. 14, 16, 121
 Schoonmaker, J. A. 33, 127
 Sears, C. C. 26, 105
 Seeler, A. O. 84
 Segall, A. J. 21, 71, 153, 160
 Seltzer, C. C. 28, 126
 Sencer, D. J. 25, 104
 Shapiro, D. S. 25, 132
 Shapiro, J. 21, 83
 Shattuck, G. C. 34
 Shaw, J. H. 127
 Simmons, J. J. 19, 113
 Simmons, S. W. 25, 105
 Skaff, V. 33, 105
 Smith, C. A. 122
 Smith, R. M. 34
 Snider, H. H. 26, 113
 Snyder, J. C. 12, 14, 16, 94, 141
 Spaulding, R. B. 12, 22

HARVARD UNIVERSITY

Spielman, A. 21, 104
Spielman, J. M. 33, 95
Stare, F. J. 14, 16, 126
Sternfeld, L. 19, 121
Stocker, G. 13
Stoudt, H. W. 21, 87
Stuart, H. C. 34
Stumm, W. 91
Suarez, A. C. 33, 129

Teele, J. E. 21, 121
Thomas, D. W. 32, 127
Thomas, H. A., Jr. 16, 91, 138
Tyler, J. M. 30, 88

Underhill, D. W. 30, 88
Uzgiris, V. I. 30, 139

Valadian, I. 19, 121, 153
Vassaux, C. E. 32, 127
Velez, H. 30, 126
Veltman, B. I. 32, 127
Viles, F. C., Jr. 28, 83
Vinson, J. W. 27, 94
von Lichtenberg, F. C. 105

Wachman, A. 32, 127

Watson, R. B. 26, 105
Wechsler, H. 26, 113
Weinstein, L. 95
Weir, J. M. 26, 105
Weissenborn, L. C. 30, 88
Weller, T. H. 12, 14, 17, 91, 104
Whiting, R. B. 32, 127
Whittenberger, J. L. 12, 14, 17, 76, 83, 87
Wiech, N. L. 30, 127
Wilkins, G. F. 19, 83
Winters, W. E. 139
Wisnieski, K. S. 32, 88
Wohl, M. E. B. 88
Worcel, M. 32, 88
Worcester, J. 17, 65, 71, 153
Wyckoff, P. S. 13, 139
Wyon, J. B. 27, 138, 141

Yacovone, J. A. 27, 113
Yankauer, A. 27, 121
Yen, S. B. 32, 71
Yenikomshian, S. A. 32, 127
Yerby, A. S. 12, 14, 17, 113, 153, 156
Young, M. A. C. 19, 113
Yuan, G. C. 30, 95

FALL TERM — FIRST PERIOD (September 25 to November 18, 1967)

		<i>Credit Units</i>	<i>Health Services Administration</i>	<i>Credit Units</i>
BEHAVIORAL SCIENCES				
1a, b Introduction to Behavioral Sciences *		1 (2)†	1a, b Provision of Health Services and Medical Care *	2 (4)
BIOSTATISTICS				
1a, b Principles of Biostatistics * §	1.50	(3)	9a, b Economics of Medical Care	2 (4)
7a, b Principles (with Epidemiology) §	.50	(1)		
DEMOGRAPHY AND HUMAN ECOLOGY				
1a Population Growth and Fertility Control *	1	(4)		
6a, b Problems of Population	2	(4)		
ENVIRONMENTAL HEALTH				
1a, b Principles of Environmental Health *	2	(4)	7a, b Ecology and Epidemiology of Infectious Diseases * (with Tropical Public Health)	2 (4)
3a, b Introduction to Radioactivity and Radiation Protection	2	(4)	7a, b Immunologic Aspects of Microbiology	2 (4)
EPIDEMIOLOGY				
1a, b Principles of Epidemiology * §	1	(2.5)	NUTRITION	.50 (1)
8a, b Human Genetics (with Microbiology)	1	(2)	1a, b Public Health Nutrition *	
PHYSIOLOGY				
			3a, b Human Physiology	1.50 (3)

Unscheduled course: Environmental Health 4a, b

* Required of M.P.H. candidates

† Figures in parentheses are units for entire course, if it runs more than one period.

§ Required of S.M. in Hygiene candidates

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:30						
9:30	ENVIRONMENTAL Health 1a, b *	BIOSTATISTICS 1a, b * §	NUTRITION 1a, b *		ENVIRONMENTAL HEALTH 1a, b *	
10:30	MICRO-T.P.H. 1a, b *	I.H. 5a, b	EPIDEMIOLOGY 1a, b * §	MICRO-T.P.H. 1a, b *	EPIDEMIOLOGY 1a, b * §	MICRO-T.P.H. 1a, b *
11:30	MICRO. 7a, b	EPID. & MICRO. 8a, b	PHYS. 5a, b	MICRO. 7a, b	LECT. & LAB. a, b	EPID. & MICRO. 8a, b
12:30						

1:30	M H. S. A. 1a, b *	I C R O. 7a, b	H E. S. A. a, b LAB.	E H. C R O. 7a, b LAB.	BEHAVIORAL SCIENCES 1a, b *	* REQUIRED OF M.P.H. CANDIDATES
					IND. HYG. 4a, b	§ REQUIRED OF S.M. HYGIENE CANDIDATES
2:30	M H. I. C. R. O. 7a, b	I C R O. 7a, b	H E. S. A. a, b LAB.	E H. C R O. 7a, b LAB.	BIOSTATISTICS 1a, b *	MICRO. T.P.H. 1a, b §
					LAB. II (SM HYG.)	LAB.
3:30	M H. I. C. R. O. 7a, b	I C R O. 7a, b	H E. S. A. a, b LAB.	E H. C R O. 7a, b LAB.	BIOSTATISTICS & EPIDEMIOLOGY 7a, b §	
					LABORATORY I (M.P.H.)	
4:30	M H. I. C. R. O. 7a, b	I C R O. 7a, b	H E. S. A. a, b LAB.	E H. C R O. 7a, b LAB.	DEMOG. & HUMAN ECOL. 1a *	
5:30						

To be scheduled: ENVIRONMENTAL HEALTH 4a, b

DEMOGRAPHY & HUMAN ECOLOGY 6a, b; Mon., Wed. and Friday, 9-10 a.m. in Cambridge

FALL TERM — SECOND PERIOD (November 20, 1967 to January 27, 1968)

		<i>Credit Units</i>	<i>Health Services Administration</i>	<i>Credit Units</i>
BEHAVIORAL SCIENCES				
Ia, b	Introduction to Behavioral Sciences *	1	(2)†	
2b	Departmental Seminar	1		
BIOSTATISTICS				
1a, b	Principles of Biostatistics * §	1.50	(3)	
7a, b	Principles (with Epidemiology) §	.50	(1)	
2b, c, d	Design of Investigations	1	(3)	
DEMOGRAPHY AND HUMAN ECOLOGY				
6a, b	Problems of Population	2	(4)	
2b, c, d	Departmental Seminar	1	(3)	
ENVIRONMENTAL HEALTH				
1a, b	Principles of Environmental Health *	2	(4)	
3a, b	Introduction to Radioactivity and Radiation Protection	2	(4)	
2b, c, d	Aviation Health and Safety	1	(3)	
EPIDEMIOLOGY				
1a, b	Principles of Epidemiology * §	1.5	(2.5)	
8a, b	Human Genetics (with Microbiology)	1	(2)	
2b, c, d	Design of Investigations	1	(3)	
Unscheduled course: Environmental Health 4a, b				
MICROBIOLOGY AND TROPICAL PUBLIC HEALTH				
1a, b	Ecology and Epidemiology of Infectious Diseases * (with Tropical Public Health)	7a, b	Immunologic Aspects of Microbiology	2 (4)
2b	Current Research in Infectious Diseases (with Tropical Public Health)	2b	Microbiology	2 (4)
NUTRITION				
1a, b	Public Health Nutrition *	2b, c, d	Public Health Nutrition *	.50 (1)
	Departmental Seminar		Departmental Seminar	1 (3)
PHYSIOLOGY				
3a, b	Human Physiology	3a, b	Human Physiology	1.50 (3)

* Required of M.P.H. candidates

§ Required of S.M. in Hygiene candidates

† Figures in parentheses are units for entire course, if it runs more than one period.

FALL TERM - SECOND PERIOD

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
ENVIRONMENTAL HEALTH 1a, b *	BIOSTATISTICS 1a, b * §	NUTRITION 1a, b *	BIOSTATISTICS 1a, b * §	ENVIRONMENTAL HEALTH 1a, b *	
MICRO-T.P.H. 1a, b *	I.H. 5a, b	MICRO-T.P.H. 1a, b *	EPI. I.H. 5 o, b	EPI. I.H. 5 o, b	MICRO-T.P.H. 1a, b *
	MICRO. 7a, b		MICRO. 7a, b	LECT. & LAB.	
11:30					
12:30					

ENV. HEALTH 1a, b *	IND. HYG. 4a, b	IND. HYG. 4a, b	BEHAVIORAL SCIENCES 1a, b *	BEHAVIORAL SCIENCES 1a, b *	
H. S. A. 1a, b *	C. R. O. 7a, b LAB.	H. S. A. 9 3a, b LECT. & LAB.	E. 3a, b LECT. & LAB.	E. 3a, b LECT. & LAB.	
3:30					
4:30					
5:30					

DEMOGRAPHY & HUMAN ECOLOGY 6a, b; Man., Wed. and Friday, 9-10 a.m. in Cambridge

To be scheduled: ENVIRONMENTAL HEALTH 4a, b

November 20, 1967 to January 27, 1968

* REQUIRED OF M.P.H.
CANDIDATES

§ REQUIRED OF S.M. HYGIENE
CANDIDATES

MICRO.
T.P.H.
1a, b *

LECT.
&
LAB.

EPI. &
MICRO.
8a, b

PHYS.
3a, b

PHYS.
3a, b

IND.
HYG.
4a, b

BIOSTATISTICS
1a, b *

LABORATORY I
(MPH)

LABORATORY I
(MPH)

MICRO.
T.P.H.
1a, b *

LAB. II
(SM HYG.)

LAB. II
(SM HYG.)

KEY TO MAP ON OPPOSITE PAGE

1 HARVARD MEDICAL SCHOOL
25 Shattuck Street
A Administration
B E2 Building
Department of Tropical
Public Health, School of
Public Health
C Vanderbilt Hall
107 Avenue Louis Pasteur

2 HARVARD SCHOOL OF PUBLIC
HEALTH
55 Shattuck Street
Administration
Behavioral Sciences
Health Services Administration
Maternal and Child Health

3 HARVARD SCHOOL OF DENTAL
MEDICINE
188 Longwood Avenue

4 HARVARD SCHOOL OF PUBLIC
HEALTH
665 Huntington Avenue
Kresge Center for Environmen-
tal Health (Industrial Hy-
giene and Physiology)
Demography and Human Ecol-
ogy
Nutrition

5 BOSTON LYING-IN HOSPITAL
221 Longwood Avenue

6 PETER BENT BRIGHAM HOSPITAL
721 Huntington Avenue

7 CHILDREN'S HOSPITAL MEDICAL
CENTER
300 Longwood Avenue

8 CHILDREN'S CANCER RESEARCH
FOUNDATION (Jimmy Fund)
35 Binney Street

9 MASSACHUSETTS MENTAL HEALTH
CENTER
74 Fenwood Road

10 HENRY LEE SHATTUCK INTERNA-
TIONAL HOUSE
199-207 Park Drive

11 JUDGE BAKER GUIDANCE CENTER
295 Longwood Avenue

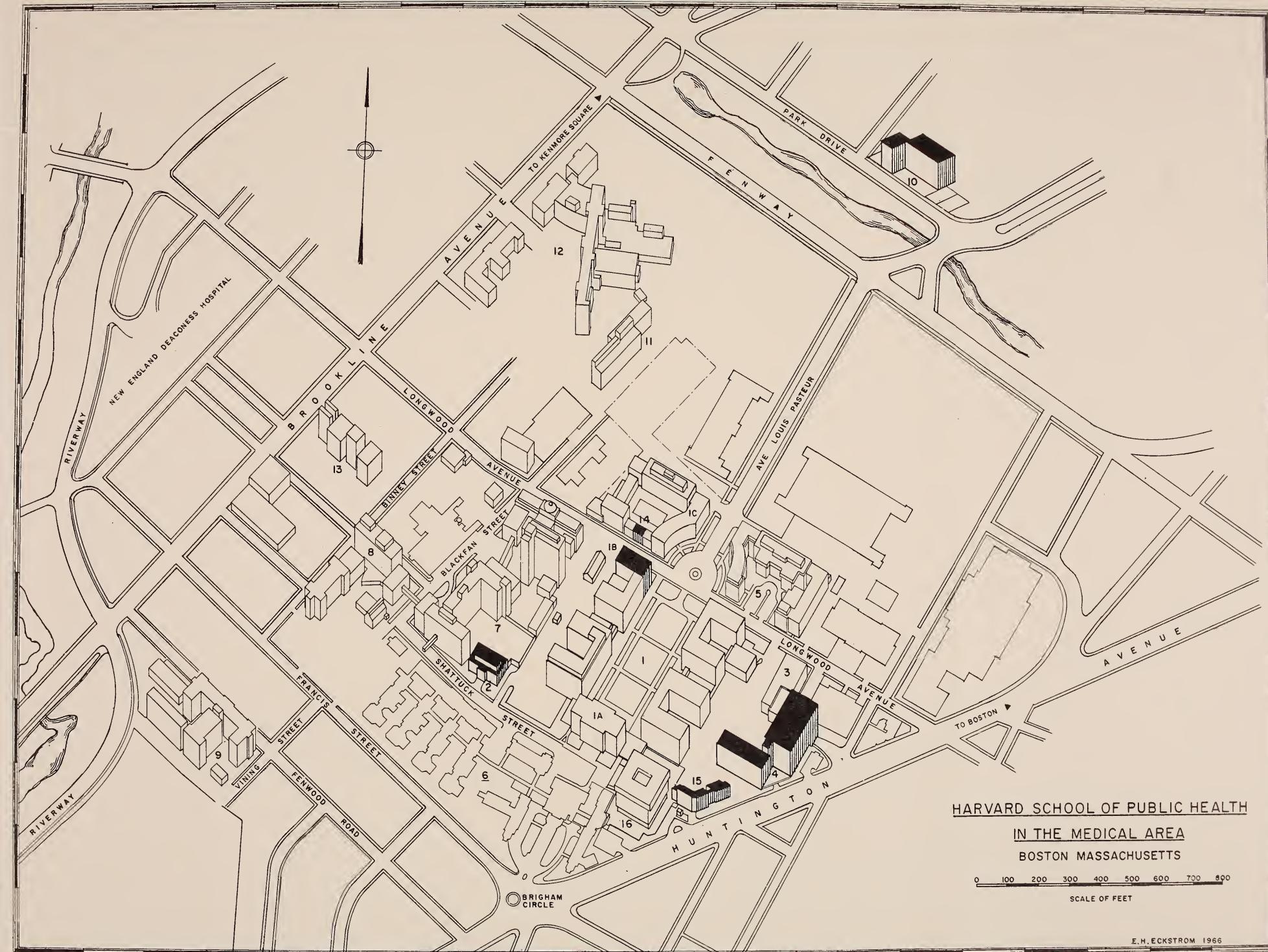
12 BETH ISRAEL HOSPITAL
330 Brookline Avenue

13 SHIELDS WARREN RADIATION LAB-
ORATORY
10 Binney Street

14 MEDICAL AREA HEALTH SERVICE
275 Longwood Avenue

15 HARVARD SCHOOL OF PUBLIC
HEALTH (Huntington Building)
1 Shattuck Street
Biostatistics
Epidemiology
Microbiology

16 FRANCIS A. COUNTWAY LIBRARY
OF MEDICINE
10 Shattuck Street



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